# Solo E1 DSU User Guide

# Digital Link

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The Solo E1 complies with CISPR-22 Level B and FCC Part 15 of the Federal Communications Commission (FCC) Rules concerning radio frequency emissions for Class A computing devices. The following section is required by the FCC.

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**NOTE:** As per the Voluntary Control Council for Interference by Information Technology Equipment (VCCI), the Solo E1 complies with VCCI Class 1 ITE. This equipment is in the 1st Class category (information equipment to be used in commercial and/or industrial areas) and conforms to the standards set by the Voluntary Control Council for Interference by Information Technology Equipment aimed at preventing radio interference in commercial and/or industrial areas. Consequently, when used in a residential area or in an adjacent area thereto, radio interference may be caused to radios and TV receivers, etc. Read the instructions for correct handling.

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet Appareil numerique de la classe A respecte toutes les exigences du Reglement sur le materiel brouilleur du Canada.

# Table of Contents

# *List of Figures*

# *List of Tables*

# *Preface*

The Solo E1 DSU User Guide provides the information you need to install, test, operate, and manage the Solo E1 DSU.

## Audience

This guide is prepared for network managers and technicians who are responsible for the installation of LAN-to-WAN equipment, and who are thoroughly familiar with the network topology in which the Solo E1 DSU is expected to operate.

## Organization

This guide is presented in paper and on-line form. The on-line version is available at www.dl.com, and requires Adobe Acrobat Reader 3.0, available at www.adobe.com.

This guide consists of:

Chapter 1, *"Introduction,"* a description of the Solo E1.

Chapter 2, *"Installation,"* instructions for installing the standalone and module.

Chapter 3, *"Configuration,"* describes how to configure the Solo E1.

Chapter 4, *"Maintenance,"* describes how to monitor, manage, and update the software.

Chapter 5, *"Diagnostics,"* describes how to test the Solo E1 through the front panel.

Chapter 6, *"Troubleshooting,"* suggests solutions to problems when they arise.

Appendix A, *"Technical Specifications,"* lists of the technical specifications.

Appendix B, *"Connector and Pin Assignments,"* lists the connector and pin assignments.

Appendix C, *"Factory Default Configuration,"* shows the device default configuration.

Appendix D, *"Configuration Worksheet,"* to record configuration information.

Appendix E, "*Software Download,*" to upgrade firmware applications.

# Conventions

This section describes the conventions used to delineate specific types of information throughout Digital Link user guides.

## Symbols

Symbols denote text that requires special attention. The information contained alongside a symbol corresponds to one of four levels of severity:

**NOTE:** Follow guidelines in this, or the previous, paragraph to use the Digital Link product more effectively.

**CAUTION:** Follow guidelines in this, or the previous, paragraph to avoid equipment damage or faulty application.

**WARNING:** Follow the instructions in this, or the previous, paragraph to avoid personal injury.

**ELECTRO-STATIC DISCHARGE — CAUTION:** Follow the instructions in this, or the previous, paragraph to avoid the discharge of static electricity, and subsequent damage to the equipment.

## Typography

Digital Link manuals delineate the names of files, commands, and actions by using the fonts and typefaces described in the following table:

| Typeface or Symbol | Purpose | Example |
|---|---|---|
| `Courier Font AaBbCc123` | The names of commands, files, and directories, as well as on-screen computer output. | Edit your`.login` file.<br><br>Use `ls -a` to list all files.<br><br>`machine_name% You have mail.` |
| **`Courier Font, Bold AaBbCc123`** | The input you provide, as contrasted with on-screen computer output. | `machine_name%` **`su`** |
| | Keystrokes that you must provide to use the application. | Press **`Ctrl-L`** to refresh the screen. |
| *Palatino Font, Italic AaBbCc123* | Command-line placeholder that you replace with a real name or value. | To delete a file, type **`rm`** *filename* |
| | Book titles, new words or terms, or words that need to be emphasized. | Refer to Chapter 6 in the *User Guide*.<br><br>These are called *class* options.<br><br>You *must* be logged in as root to access this directory. |
| ▼<br>Zapf Dingbats Font | Symbol that denotes a single-step procedure or task. Procedures requiring more than one task are numbered. | |
| <u>***Palatino Font, Bold Blue, Underscore AaBbCc123***</u> | Hyperlinks in the table of contents.When viewing the Portable Document Format (PDF) version of the user guide, you can click on one of these to jump directly to the selected subject matter. | |
| Palatino Font, Blue AaBbCc123 or AaBbCc123 | Hyperlinks throughout general text. | |
| **Helvetica Bold** | Denotes actual markings on front or back panels. | Attach the cable to the **TERMINAL** port |

## Digital Link Technical Support

If you should experience difficulty with the setup and/or operation of your Digital Link equipment, the Digital Link Technical Support staff can assist you at any time.

| | |
|---|---|
| Telephone | (408) 745-4200 |
| FAX | (408) 745-4240 |
| Email | support@dl.com |
| Internet | www.dl.com |

## Returning a Unit

Use the following procedure if you need to return a unit for service or repair,

1. **Contact the Digital Link Customer Service Department at (408) 745-4200, or via e-mail at era@dl.com, or fax a request to (408) 745-4240 to obtain an ERA (Equipment Return Authorization) number.**

2. **Package the unit carefully and, before sealing the shipping carton, include any information you can provide about the problems you are currently experiencing with the unit.**

3. **Attach an address label to the shipping carton. Be sure to include the ERA number:**

Customer Service Department

Digital Link Corporation

217 Humboldt Court

Sunnyvale, CA 94089

ERA # _____

## Send Us Your Comments

Please let us know if this user guide meets your requirements.

Does the manual answer your questions?

Is the manual thorough?

Is the manual easy to use: can you find the information you need?

Is anything missing from the manual?

What would you like to see in the manual?

| Digital Link Technical Publications | |
|---|---|
| FAX | (408) 745-6250 |
| Email | techpubs@dl.com |

All suggestions and comments are appreciated.

# *1* *Introduction*

## Solo E1 Features

The Solo E1 DSU (Data Service Unit) is a single data port DSU that enables access to high-speed public and private E1/FE1 (Fractional E1) networks. This user guide describes both the Solo E1 Standalone and Ensemble shelf module products. The standalone is shown in Figure 1-1.

The Solo E1 DSU transmits and receives a signal from a DTE device. The Solo E1 DSU converts V.35, RS449, EIA-530 and X.21 compatible DTE data for E1/FE1 network transport. The Solo E1 DSU is ideally suited for point-to-point E1 and FE1 connections of multiple data internetworking devices.

The Solo E1 DSU offers a full DSU interface with SNMP network management capability (including RFC 1406). It is compatible with the DL600E, a Fractional E1 Multiplexer that provides access to various network services.



Figure 1-1    The Solo E-1 DSU

These management capabilities can be accessed directly, through a modem, or over the Ethernet (through the Management Access Processor (MAP); refer to the MAP User Guide).

• The Solo E1 DSU connects high-speed bridges, routers and other data terminal equipment to the Internet and frame relay networks. The Solo E1 DSU readily supports point-to-network and multi-point configurations. The Solo E1 DSU is available as a standalone or module that plugs into the Ensemble WAN Access System.

Figure 1-2 shows a typical multi-point frame relay network application. Using multiple Solo E1 DSUs, you can also have multiple network connections with the DL600E.
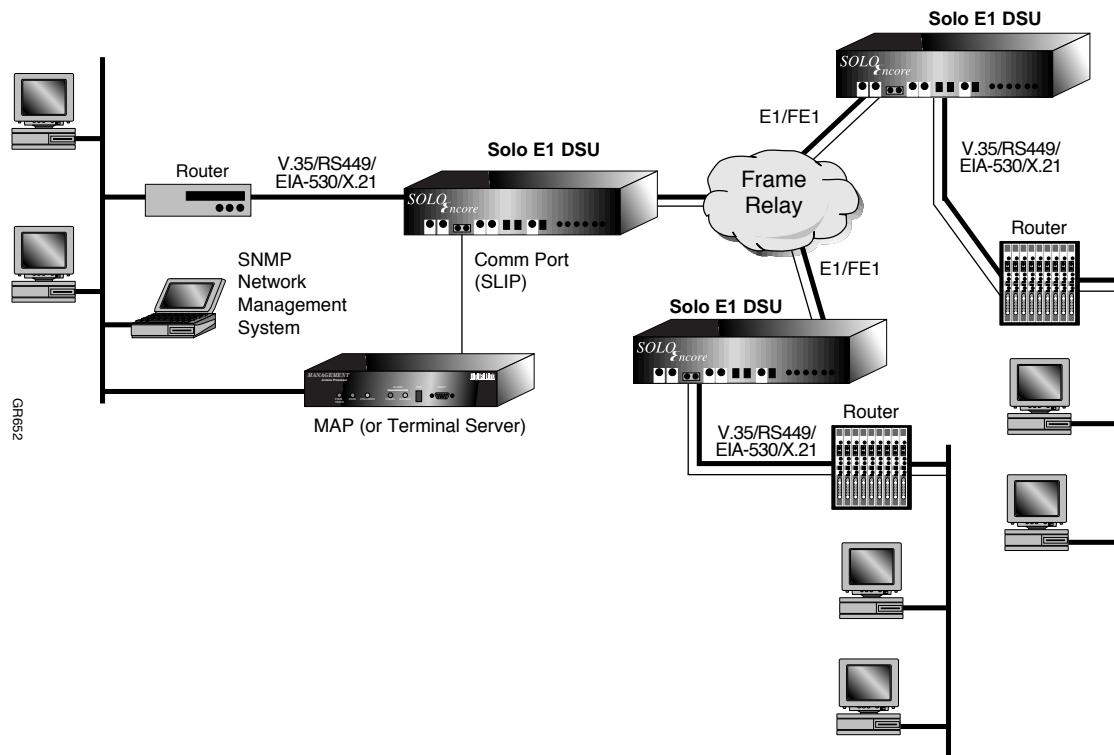


Figure 1-2    Typical Multi-point Frame Relay Network App.

## Service Features

• E1/FE1 point-to-point connectivity
• Access to fast packet services such as Frame Relay and SMDS
• IBC-based communications with the far-end unit
• HDB3 line encoding schemes
• A single DATA port with:
    • Software configuration for V.35, RS-449, EIA 530 or X.21

- DTE or DCE interface and a DB-25 connector on the back
- Bandwidth mapping into contiguous or manually selected 64 kbps slots
- Selectable data rates from 64 kbps to 1.984 Mbps
- Smooth clock at all data rates
- Timing options: SCTE, SCT or inverted SCT clock

## Management Capabilities

Management is a critical aspect of any network. The management and configuration capabilities of the Solo E1 DSU include a wide range of management access solutions including telnet, and SNMP management.

- Access for a terminal, telnet connection, modem or SNMP management station
- Embedded SNMP agent
- Support for SNMP RFC 1406 for E1, MIB II (RFC 1213) and enterprise MIBs
- Monitor the state of the Solo E1 DSU
- Monitor the state of the NET and DTE ports
- View and set configuration parameters
- Perform diagnostics and display an Event Log
- Examine NET and DTE performance databases
- Front panel LEDs
- Performance monitoring and built-in test patterns and diagnostic tools to help maintain the line and troubleshoot problems
- Alarm reports sent to a terminal, printer or dial-out
- Downloadable code

# 2 *Installation*

This chapter describes installing the Solo E1 DSU Standalone and module:

- "Pre-Installation Checks" on page 2-1 (apply to both the Solo E1 DSU and module)
- "Terminal and DIP Switch Mode" on page 2-2
- "Cable Requirements" on page 2-2
- "Installing the Solo E1 DSU Standalone" on page 2-3
- "Installing The Solo E1 DSU Module" on page 2-17

## Pre-Installation Checks

Before installing the Solo E1 DSU  or module, check the shipping package(s) and prepare the network information and the installation site.

### Check the Package(s)

- Unpack and inspect the Solo E1 DSU for damage that may have occurred during shipment.
- Save all enclosed packing slips and documents. Save shipping cartons and packing materials until you have completed the installation and verified device operation.
- Verify that all equipment ordered matches the packing slip. If the equipment does not match your order, contact Digital Link Customer Support.
- Fill out and mail the registration card.

### Prepare Network Information

Request the following information from your network administrator before you install the Solo E1 DSU:

- Solo E1 DSU IP address—To enable a Telnet connection to the Solo E1 DSU from a remote terminal.
- To use SNMP network management, one to three NMS IP addresses in addition to the above IP address. These addresses are where the Solo E1 will send traps.

# Terminal and DIP Switch Mode

On the rear of the standalone and/or the module board are two DIP switch banks. DIP switch S2-12 allows the mode choice shown in Table 2-1.

Table 2-1    DIP Switch S2-12 Description

| Switch Position | Mode | Description |
|---|---|---|
| Up | Terminal | Allows you to modify device configuration, monitor status, and perform tests. |
| Down (default) | DIP Switch | Allows you to monitor device status, and perform minimal testing. |

After you assign an IP address to the Solo E1 DSU from a terminal, you can also use Telnet or SNMP to log on to the Solo E1 DSU.

# Cable Requirements

Table 2-2 lists the general communication cable requirements for the standalone and module. (For Digital Link equipment model numbers and descriptions, refer to the tables in "Cable Connections" on page 2-12, and to Table A-10 on page A-5.)

Table 2-2    Solo E1 DSU Cabling Equipment Requirements

| Cabling Equipment | Description |
|---|---|
| One of:<br>• Comm port cable (with a DE-9 male connector on one end)<br>• Multi-drop ribbon cable with multiple DE-9 connectors.<br>• DE-9 to DB-25 adapters and null-modem adapter | • To connect a terminal, modem or SNMP workstation<br>• To connect multiple Solo E1 DSUs in a daisy chain (for centralized management)<br>• For connection to other DTE devices |
| DTE interface cable | DB-25 male connector to the Solo E1 DSU and V.35 connector to the DTE (depends on required interface) |
| Network port cable | BNC or DA-15 male connector to the Solo E1 DSU. Standard. (Digital Link can provide 4.57 m (15 ft) or 7.62 m (25 ft) cables or a DA-15/RJ-48S adapter.) |

Table 2-3 list the power requirements for the Standalone Solo E1. The shelf meets all the power requirements for the module.

Table 2-3   Solo E1 DSU Standalone Power Requirements

| Power | Description |
|-------|-------------|
| AC Power cable | For connection to 100-240 VAC, 50/60 Hz |
| DC power requires a tray cable | Cable must be UL-approved for connection to -40 to -72 VDC, 14 AWG, 3 conductor, copper strand wire, electrical power and control tray cable, type TC: tray cable, 600 V 90°C. (An example is Alpha Wire Company No. 45443.) |
| Equipment grounding cable | Provides the earth ground connection. (Refer to "Related Model Numbers" on page A-5.) |

**NOTE:** For cable and connector pin assignments, refer to Appendix B, "Connector and Pin Assignments"

# Installing the Solo E1 DSU Standalone

Install the Solo E1 DSU on a flat surface or mount it in a 19" or 23″ rack.

## Installing on a Flat Surface

To install the Solo E1 DSU on a flat surface:

1. **Attach the rubber feet to the bottom of the Solo E1 DSU.**

2. **Place the Solo E1 DSU on a flat, stable surface.**

   You may stack other similar units on top of the Solo E1 DSU.

3. **Set the DIP switches.**

   Refer to "Setting the DIP Switches on the Solo E1 DSU Standalone" on page 2-5."

4. **Connect AC or DC power.**

   Refer to "Connecting the Standalone to AC or DC Power" on page 2-8).

## Installing on a Tray

A tray can secure 2 Solo E1 DSUs. Rack-mounting requires a mounting tray.

To mount the Solo E1 DSU on a tray (Figure 2-1):

1. **Attach the Solo E1 DSU to the tray:**

   a. **Place the Solo E1 DSU on the tray and align the bottom holes of the Solo E1 DSU with the holes in the tray.**

   b. **Use the screws (provided) and secure the Solo E1 DSU to the tray.**

2. **Attach the tray to a 19 inch or 23 inch rack.**

   a. **Place the tray with the Solo E1 DSU attached in the rack.**

   b. **Secure the tray to the rack with the screws (provided).**
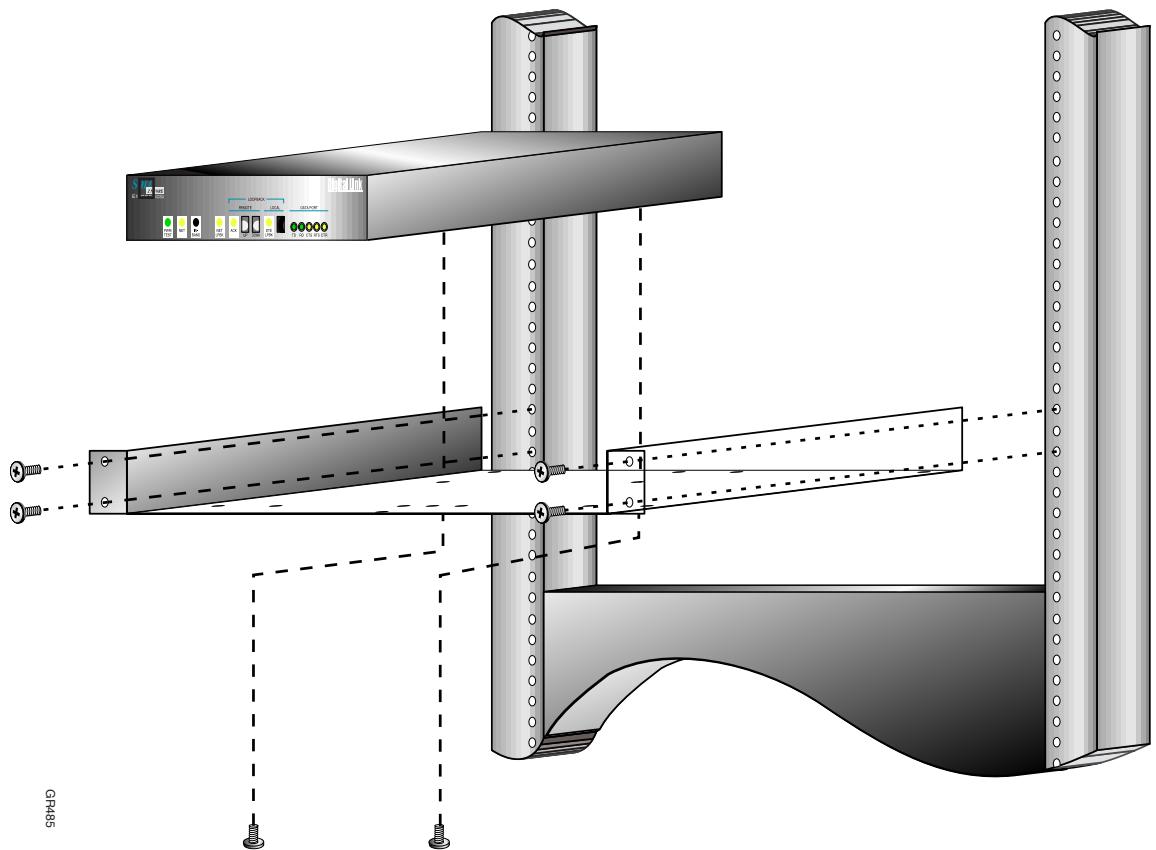
Figure 2-1    Solo E1 DSU Tray and Rack Mount

## Setting the DIP Switches on the Solo E1 DSU Standalone

The S1 and S2 DIP switches are located in the rear of the unit.

DIP switch mode is the active mode by default (switch S2-12 is OFF). The default is all switches OFF (Figure 2-2).
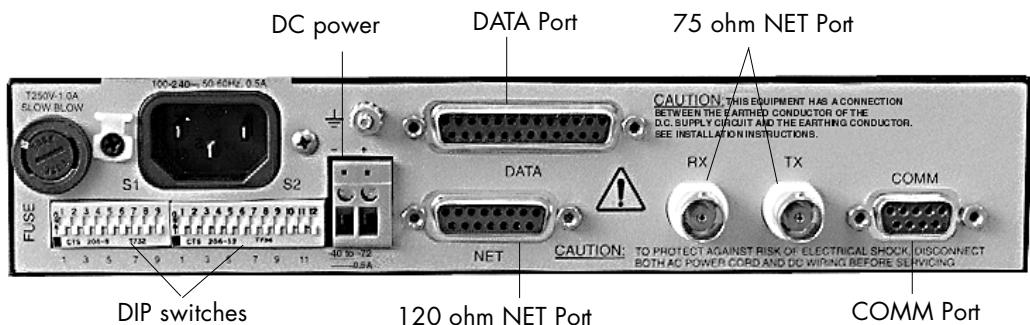


Figure 2-2    Solo E1 DSU Rear Panel

Table 2-4 and Table 2-5 on page 2-8 describe the S1 and S2 DIP switches.

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**CAUTION:** Only connect one network port at a time (75 or 120 ohm), unit may cause network harm if both ports are used.

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**NOTE:** Switches 8,9 are not used on Bank S1 and switches 3,4 are not used on Bank S2.

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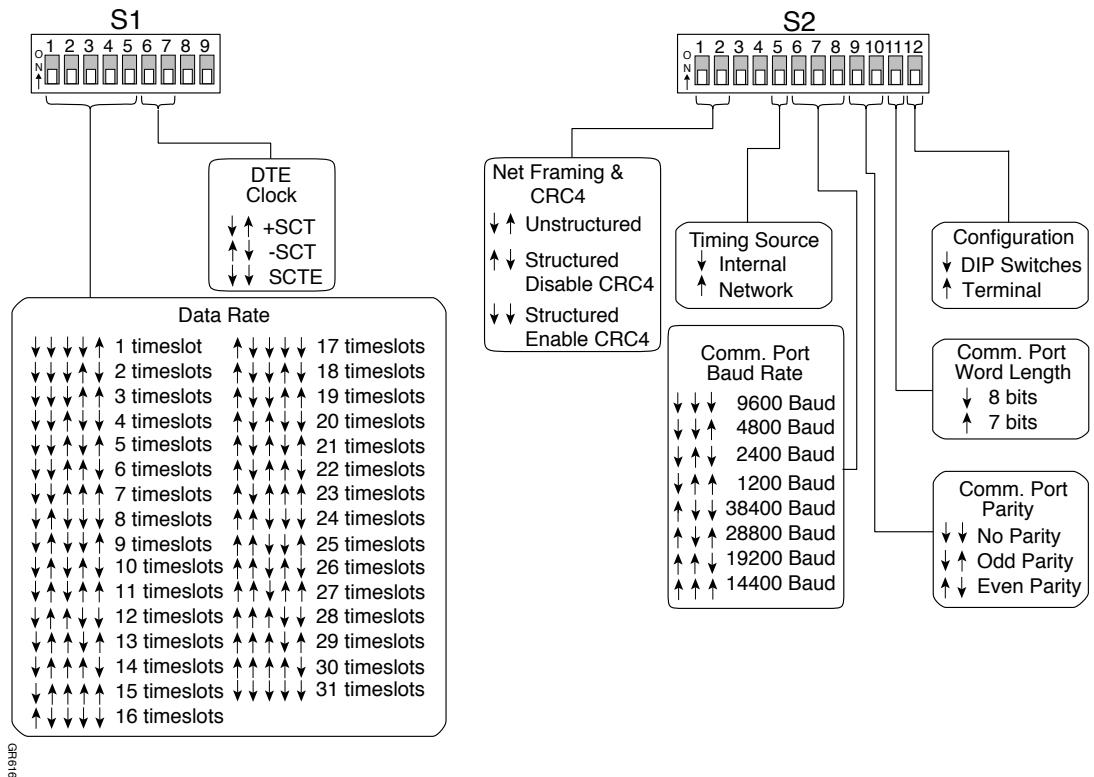
Figure 2-3    S1 and S2 DIP Switch Settings

Solo E1 DSU instructions for DIP switch configurations are located on the bottom of the unit (Figure 2-3).

Table 2-4 and Table 2-5 describe the DIP switches for S1 and S2, respectively.

Table 2-4   Solo E1 DSU Standalone and module DIP Switch S1

| Name (Default) | DIP Number | Description/Options |
|---|---|---|
| Data Rate (31 timeslots) | 1-5 | Set DTE data rate, from 1 to 31 timeslots. |

Table 2-4   Solo E1 DSU Standalone and module DIP Switch S1

| Name (Default) | DIP Number | Description/Options |
|---|---|---|
| DTE Clock (SCTE) | 6, 7 | Sets DTE Clock: +SCT, -SCT, or SCTE. |
| Not Used | 8, 9 | For future expansion |

(Also refer to "Basic Parameters Using Menu-4 Main Configuration" on page 3-7.)

Table 2-5   Solo E1 DSU Standalone and module DIP Switch S2

| Setting (Default) | DIP Number | Description/Options |
|---|---|---|
| CRC4 Check (CRC Enabled) | 1 | Enabled or disabled. |
| Not Used | 2, 3, 4 | For future expansion |
| Timing Source (Internal) | 5 | Internal or network |
| **COMM** Port kbps (9600 bps) | 6, 7, 8 | 1200, 2400, 4800, or 9600 bps 14.4, 19.2, 28.8, or 38.4 kbps |
| **COMM** Port Parity (None) | 9, 10 | None, odd, or even. Use to detect transmission errors with an odd or even bit. |
| **COMM** Port Word Length (8) | 11 | Set the word length to 7 or 8 bits. |
| Configuration (DIP Switches) | 12 | Set configuration by using terminal or DIP switches. |

## Connecting the Standalone to AC or DC Power

This section describes:

- "Connecting Standalone to AC Power" on page 2-9
- "Connecting Standalone to DC Power" on page 2-9
- "Grounding the Solo E1 DSU" on page 2-11
- "Cable Connections" on page 2-12

## *Connecting Standalone to AC Power*

To connect the Solo E1 DSU to AC power:

**1. Insert the AC power cable into the power receptacle on the rear panel.**

**2. Connect the other end to a suitable AC outlet.**

The LEDs on the front panel flash as the Solo E1 DSU automatically runs the Self Test at power up. The PWR/TEST LED blinks yellow and then illuminates green when the test is successful. If Self Test fails, the LED illuminates red for 10 seconds and then illuminates green; contact Digital Link Technical Support.

**CAUTION:** The Solo E1 accepts use of any nationally approved cordset with an IEC 320 connector.

## *Connecting Standalone to DC Power*

For safety, install the Solo E1 DSU in a Restricted Access Area in accordance with Articles 110-16, 110-17, and 110-18 of the National Electric Code, ANSI/NFPA 70. An example is a dedicated equipment room or closet that is clean, well-ventilated, and free of environmental extremes. Allow two to three feet of clearance for access.

**CAUTION:** If you connect the Solo E1 DSU improperly to DC power, you may damage the Solo E1 DSU.

Use only a tray cable that is UL recognized 14 AWG, 3 conductors, copper strand wire, electrical power and control cable, type TC: tray cable, 600 V 90° C. An example is Alpha Wire Company No. 45443.

The Solo E1 DSU will operate on -48 to -72 VDC sources.

To connect the Solo E1 DSU to DC power **(Figure 2-4** ):

**1. Prepare the tray cable:**

**a. Strip 5 cm (2 in) of jacket material off the tray cable.**

**b. Strip 1.27 cm ( ½ in) of insulation off each wire.**

2. **Connect the tray cable to the Solo E1 DSU DC power connector:**

   a. **Plug the colored wire to the positive (+) terminal.**

   b. **Plug the black wire to the negative (-) terminal.**

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⚠️ **CAUTION:** Verify that the connections are:

- DC source negative (-) to Solo E1 DSU negative (-)
- DC source positive (+) to Solo E1 DSU positive (+)

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3. **Connect to the DC power source:**

   a. **Connect the colored wire to the positive (+) source.**

   b. **Connect the black wire to the negative (-) source.**

4. **Connect the earth ground wire to the ground stud.**

   Use a .63 cm (¼ in) wrench.

5. **Secure the tray cable with cable ties.**

   Use multiple cable ties to minimize disturbance to the wires through casual contact.

   Use at least four cable ties, a minimum of 10.16 centimeters (4 in) apart, with the first within 15.24 centimeters (6 in) of the terminal block. **Figure 2-4** shows the cable tie mount next to the fuse.

6. **Connect the tray cable to the DC power source.**

   The LEDs on the front panel flash as the Solo E1 DSU automatically runs the Self Test. The pwr/test LED blinks yellow and then illuminates green when the test is successful. If the test fails, the LED illuminates red for 10 seconds and then illuminates green.

DC Power Connector



Cable Tie

-48 to -72 VDC, 0.5A

Strip the DC tray cable:

5 cm   1.27 cm

Tray Cable Jacket        Insulation        Wire
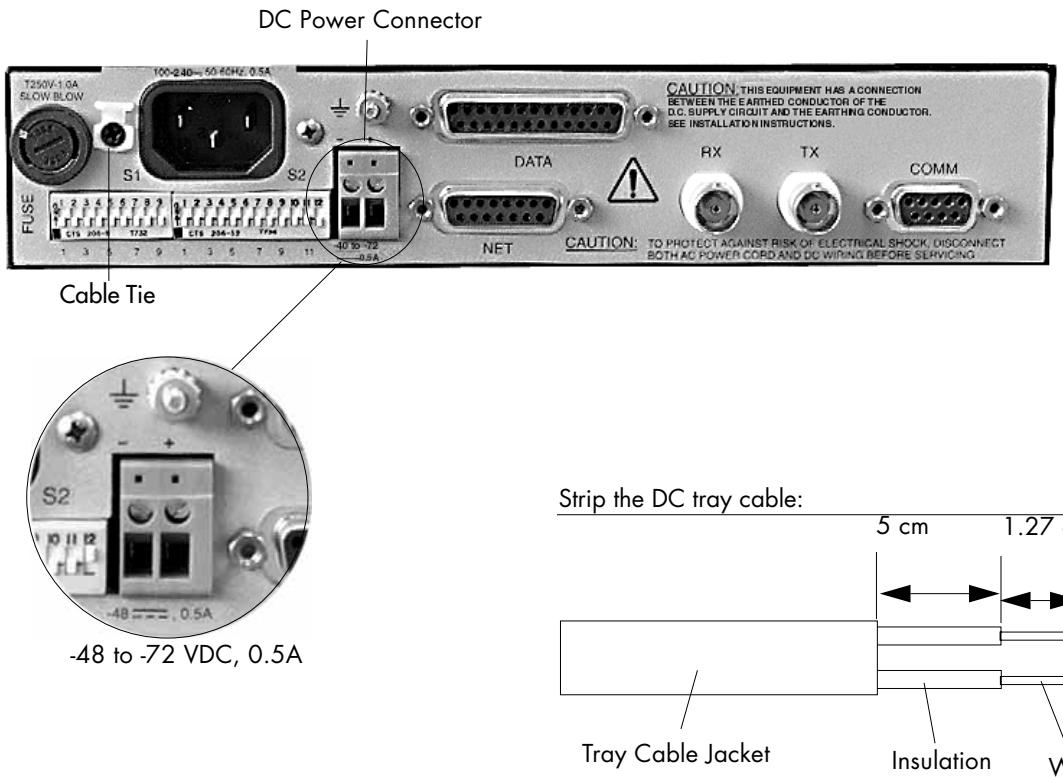
Figure 2-4    Preparing the DC Power Tray Cable

## Grounding the Solo E1 DSU

Ground the Solo E1 DSU to earth ground using a grounding cable connected to the ground stud on the rear panel.

An equipment grounding conductor or cable is connected to ground at the service equipment and should be installed as part of the circuit supplying the system and should not be smaller in size than the ungrounded branch-circuit supply conductors.

The attachment-plug receptacle in the vicinity of the system should be a grounding type. The grounding conductor to it should be connected to earth ground at the service equipment.

A bare, covered or insulated grounding conductor is acceptable. A conductor that is individually covered or insulated should have an outer finish that has a green continuous outer finish, or green with one or more yellow stripes.

## Cable Connections

To connect the Solo E1 DSU (Figure 2-5):

1. **Connect the DTE cable (refer to Table 2-7):**

   a. **Connect the DTE cable to the Solo E1 DSU DB-25 socket connector.**

   b. **Connect the opposite end to the DTE equipment.**

2. **Choose your network connection, either (refer to Table 2-6):**

   **Socket:**

   a. **Connect the network cable to the Solo E1 DSU DA-15 socket connector.**

   b. **Connect the opposite end to the NET equipment.**

   **BNC:**

   a. **Connect a coaxial cable from the Solo E1 DSU RX BNC to your network TX connector.**

   b. **Connect a coaxial cable from the Solo E1 DSU TX BNC to your network RX connector.**
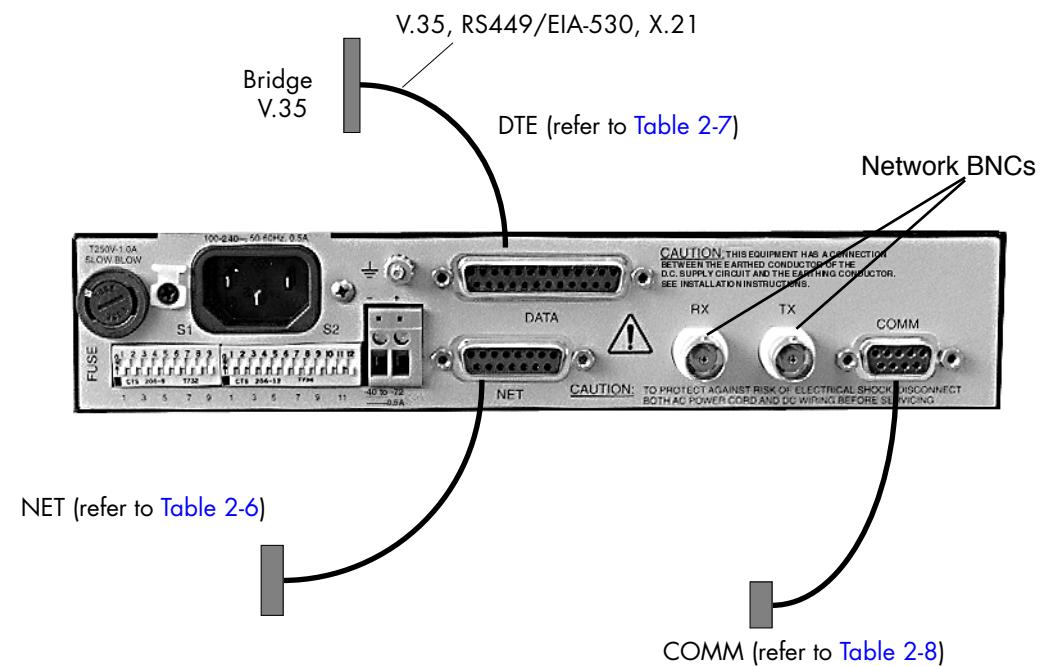
Figure 2-5    Connecting to DATA, COMM, and NET

**NOTE:** DA/B/E ports are 120 ohm and BNC ports are 75 ohm

Table 2-6   Solo E1 DSU Network Cable Description

| P/N | Description |
|-----|-------------|
| DL1007 | DA-15 plug to DA-15 plug, 2.1 m (7 ft) |
| DL1016 | DA-15 socket to DA-15 plug, 2.1 m (7 ft) |
| DL1405-10 | 75 ohm coaxial network cable, 3.0 m (10 ft) |

Table 2-7   Solo E1 DSU DTE Cable Descriptions

| P/N | Description |
|-----|-------------|
| DL1300-10 | V.35, DB-25 plug to M34 plug, 3.0 m (10 ft) |
| DL1301-01 | V.35, DB-25 plug to M34 socket, 0.30 m (1 ft) |
| DL1301-10 | V.35, M34 socket to DB-25 plug, 3.0 m (10 ft) |
| DL1303-10 | RS-449, DB-25 plug to DC-37 socket, 3.0 m (10 ft) |
| DL1310-10 | X.21, DB-25 plug to DA-15 plug, 3.0 m (10 ft) |
| DL1311-10 | X.21, DB-25 plug to DA-15 socket, 3.0 m (10 ft) |

Table 2-8   Solo E1 DSU COMM Port Cable Description

| P/N | Description |
|-----|-------------|
| DL1081 | DE-9 socket to DE-9 plug, 2 connectors |
| DL1082 | DE-9 socket to DE-9 plug, 4 connectors |
| DL1083 | DE-9 socket to DE-9 plug, 8 connectors |

Use DL1081, DL1082, and DL1083 to daisy-chain Solo E1 DSUs (refer to ).

## Connecting a Terminal to the Standalone

Connect an ASCII terminal directly to the **COMM** port or indirectly, through a modem. A modem connection allows remote Solo E1 DSU configuration. The **COMM** port requires a terminal or terminal emulation program that supports ANSI or VT100 modes.

## Check the COMM Port Parameters

Verify that the **COMM** port parameters on the Solo E1 DSU and terminal or modem match. The defaults are:

- Baud rate—9600

- Parity bit—none

- Word length—8

- Stop bits—2

To change the **COMM** port parameters on the Solo E1 DSU Standalone. (Figure 2-3 on page 2-7)

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**NOTE:** Cable length must not exceed 15.24 m (50 ft) with a direct connection set at 9600 baud.

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## Connect the Terminal to the COMM Port

To connect a terminal to the **COMM** port (Figure 2-5 on page 2-13):

**3. Plug the male DE-9 connector into the Solo E1 DSU DE-9 COMM connector.**

Use a 9-pin RS-232 straight cable.

**4. Plug the opposite end of the cable into the terminal connector.**

## Connect a Modem

To change the Solo E1 DSU settings, refer to Figure 2-3 on page 2-7.

To connect a modem to the **COMM** port, see Figure 2-5 on page 2-13:

**1. Match the baud rate, parity bit, word length and stop bit settings for the Solo E1 DSU, both modems, and terminal.**

If the settings are not the same, communication between the devices will fail or display miscellaneous characters.

**2. Connect the modem to the Solo E1 DSU C connector.**

Use a DE-9 plug to the Solo E1 DSU, and a crossover (null modem) cable/adapter to the modem.

3. **Connect the remote terminal:**

    a. **Plug the phone line to the modem.**

    b. **Connect the modem to the remote terminal.**

To configure a remote Solo E1 DSU, refer to "Remote Solo E1 DSU-Modem Connection" on page 3-25.

# Connecting Multiple Standalone Solo E1 DSUs

You can connect Digital Link Solo E1 DSUs in a daisy-chain configuration using a multidrop cable. With this configuration, you can connect multiple Solo E1 DSUs to a single terminal, modem, or SNMP workstation. Use a ribbon cable (available from Digital Link) with DE-9 connectors. For part numbers, refer to Table 2-8 on page 2-14.

## DE-9 Connector, Pin 8

Digital Link products implement a proprietary collision avoidance algorithm that uses the CTS signal on Pin 8 of the DE-9 connector.

**NOTE:** Make sure CTS (pin 8) on the socket DE-9 connector is not connected to Pin 8 on the male connector. CTS pin 8 must be connected between Solo E1 DSUs, but must not be connected to the terminal.

If your cable is not from Digital Link, verify that pin 8 is not connected.

To daisy-chain Solo E1 DSUs, use a ribbon cable with DE-9 connectors:

4. **Connect the socket DE-9 connector to the terminal or modem (if at a remote site).**

5. **Connect the male DE-9 connector to the    COMM   port on each Solo E1 DSU.**

Figure 2-6 shows three Solo E1 DSUs connected to a terminal in a daisy-chain configuration.
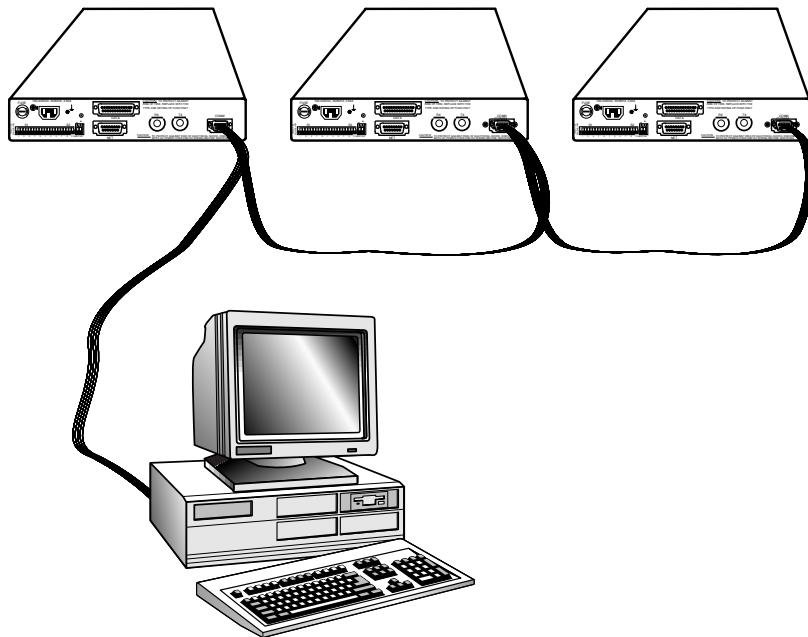
Figure 2-6    Solo E1 DSUs Daisy-Chained to a Terminal

## Installing The Solo E1 DSU Module

Request this information from your network administrator before you install the Solo E1 DSU module:

• Solo E1 DSU IP address—To enable a Telnet connection to the Solo E1 DSU from a remote terminal.

• To use SNMP network management, request one to three NMS IP addresses in addition to the above IP address.

Refer to the Ensemble WAN Shelf Installation Guide, Part Number 098-01905-02.

**NOTE:** You do not have to power down the shelf to install the module because they are hot-swappable.

## Installing the Module

To install the module:

1. **Check the contents of the shipping carton.**

   Check for visible damage to the shipping carton and to the module.

2. **Get and wear a static wrist strap.**

   To prevent static electricity from damaging the module.

3. **Open the anti-static wrap and withdraw the module.**

4. **Set the jumper settings (refer to Figure 2-7 and Table 2-9).**

5. **Insert the module into any open slot in the shelf.**

   From the front of the shelf, all empty slots except the far right slot (reserved for the controller or MAP module).

Use Table 2-9 and Table 2-10 to configure the jumpers shown in Figure 2-7.
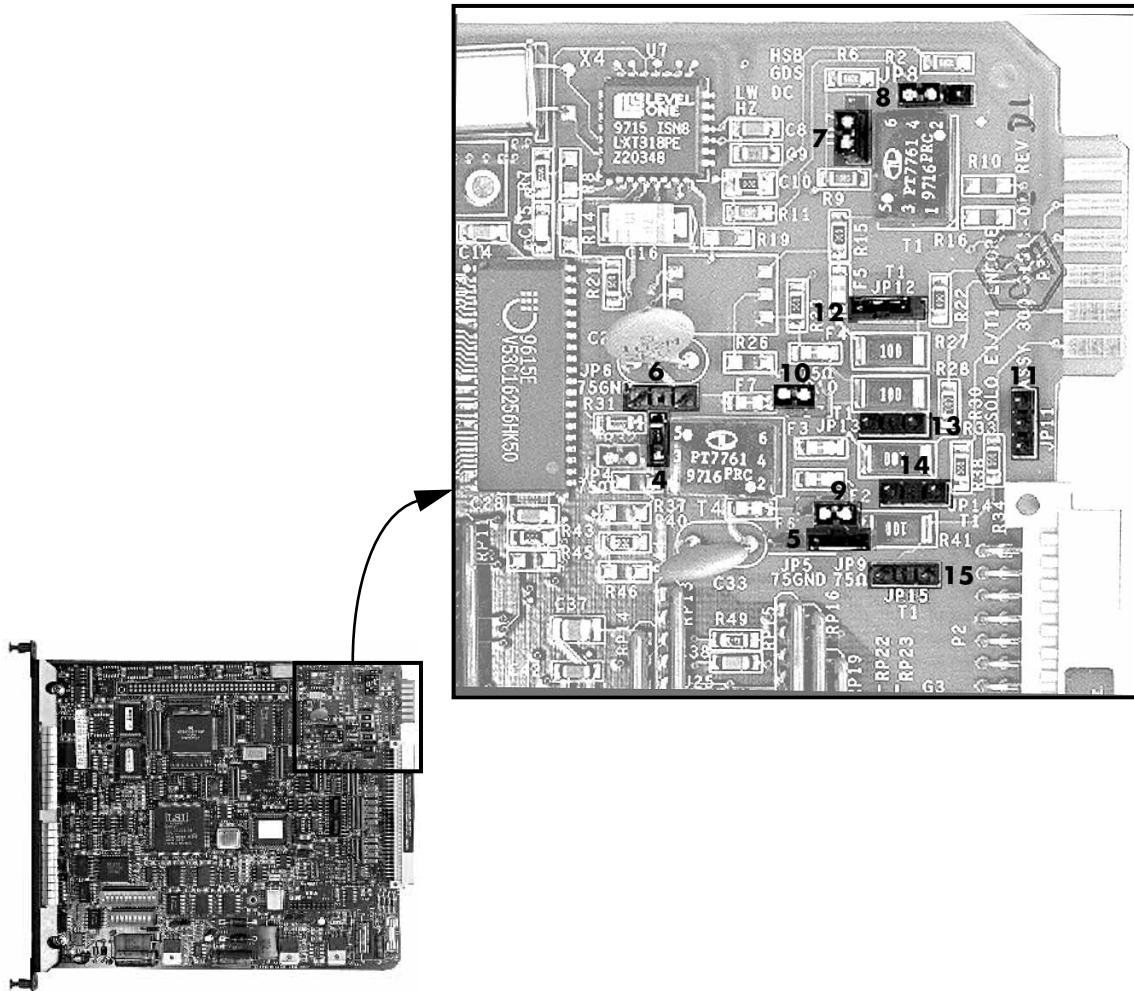


Figure 2-7    Module Jumper Settings

Table 2-9    Ensemble Shelf DL2000E Module Jumper Settings

| Ensemble Shelf DL2000E | Module DL2020E-075b | Module DL2020E-120d |
|---|---|---|
| Jumpers 7, 8 | Required. Jumper default: 1-2. | Required. Jumper default: 1-2. |
| 11 | Open (frame ground) | Open |
| 12, 13, 14, 15 | Open | Open |
| 4, 5, 6, 9, 10 | Jumpered, 75 ohm (BNC). | Open, 120 ohm |

Table 2-10 Ensemble Shelf DL2001 Module Jumper Settings

| Ensemble Shelf DL2001 | Module DL2020E-120NA |
|---|---|
| Jumpers 7, 8 | Required. Jumper default: 1-2. |
| 11 | Open |
| 12, 13, 14, 15 | Jumper 1-2. Directs signal to network port. |
| 4, 5, 6, 9, 10 | Open, 120 ohm |

# Standalone And Module Front Panel LEDs

The LEDs on the Solo E1 DSU provide the status of the data port, network port, and diagnostic tests.

Table 2-11 Solo E1 DSU LED Descriptions

| Item | Status | Description |
|---|---|---|
| PWR/TEST LED | Solid green | Power is on. |
| | Off | Power is off. |
| | Solid yellow | Test is running (other than Self Test). |
| | Blinking yellow | Self Test running. |
| | Solid red | Self Test failed. LED turns green after 10 sec (Module—a solid red LED means alarm is present) |
| NET LED | Solid green | E1 network operation normal. |
| | Off | Loss of network signal. |
| | Solid red | Solo E1 DSU cannot synchronize to net frame. Receiving CRC4 or CV. |
| | Alternate red/green | Remote Alarm Indication bit asserted in signal from network port. |
| | Solid yellow | |
| NET LPBK LED | Solid yellow | Net Loopback test running. |
| REMOTE LPBK ACK LED | Solid yellow | Solo E1 DSU has detected Set or Reset code. |
| | Blinking yellow | Blinks 3 sec when Loop Up or Loop Down remote test successful. |
| | Off | Solo E1 DSU has not detected Set or Reset code. |
| DTE LPBK LED | Solid yellow | Solo E1 DSU performing DTE Loopback test initiated by user of management station. |
| | Blinking yellow | Solo E1 DSU performing DTE Loopback test initiated by DTE equipment asserting LT line. |
| TD | Solid green | Pulses from DTE detected. |
| | Off | No pulses from DTE detected or no DTE connected. |
| RD | Solid green | Pulses to DTE detected. |
| | Off | No pulses to DTE detected, Net carrier loss or Net sync loss signal detected. |

Table 2-11 Solo E1 DSU LED Descriptions (Continued)

| Item | Status | Description |
|------|--------|-------------|
| RTS | Yellow<br>Off | Request to send line (RTS) from DTE is asserted.<br>RTS line removed, indicating unit is not sending valid data. |
| CTS | Yellow<br>Off | Clear to send line (CTS) to DTE is active.<br>CTS line removed, indicating unit is not sending valid data. |
| DTR | Yellow<br>Off | Data terminal ready line (DTR) from DTE is active.<br>DTR line from DTE is inactive. |

# ≡ *3*     *Configuration*

This chapter provides procedures to set up the Solo E1 DSU:

## Logging On and Off

The conditions for logging on differ when the Solo E1 DSU terminal interface is free or when another user is currently connected.

Systems with blank IDs are always logged on and cannot be logged off until you assign a unit ID to that Solo E1 DSU. (Refer to "Basic Parameters Using Menu-4 Main Configuration" on page 3-7).

Use one of these two methods to log on to the Solo E1 DSU:

- From a terminal (directly or through a modem)
- From a remote terminal through a telnet connection

### The Unit ID

To log on to a Solo E1 DSU, press **Ctrl-X**, and enter the unit ID of that Solo E1 DSU.

To display the unit ID of the Solo E1 DSU, press **Ctrl-X** five times. The unit ID appears on the left side of the screen. (For first time setup, the unit is usually factory configured with an alphanumeric number.)

If the ID does not appear, check the **COMM** port configuration and connection.

---

**NOTE:** To reset the unit to factory configuration, press and hold the three buttons located on the front of the unit for 10 seconds.

---

## Log On from a Terminal

When you log on for the first time, use the following steps:

1.  **Press `Ctrl-X`, type the unit ID, and press Return.**

    The screen will not reflect this information as it is typed.

    If the module is password protected and no other user is logged on, you are prompted with a message similar to:

    ```
    Current Unit ID is MAUI.

    Now you need a password to log in:
    ```

    If there is no password protection, Menu-1 Status will automatically launch (always occurs with a new installation).

2.  **Type in the password, and press Return.**

    Menu-1 Main Status appears. If there is no response, you may have an incorrect ID or a bad **COMM**  port connection.

## Log On Through Telnet

The Solo E1 DSU may or may not have a user logged on. To log on through telnet (when no other user is logged on):

1.  **Enter the telnet command and the IP address of that Solo E1 DSU.**

    Example of system response:

    ```
    Current Unit ID is MAUI.

    Now you need a password to log in:
    ```

2.  **Enter the normal or Superuser password.**

    For Superuser/normal user information refer to "User And Superuser Log On Rights" on page 3-4.

**NOTE:** After a fifth unsuccessful attempt to log on, the Solo E1 DSU closes the telnet connection. To clear the attempts, type `Ctrl-X` five times, then start log on again.

## Logging Off

To log off, press `Ctrl-X`.

When the terminal stops responding to your keystrokes, you are logged off.

# Access Rights

The Solo E1 DSU supports Superuser or normal user access rights. The Superuser has the highest priority.

## Assigning User Passwords

It is important that you specify unique Superuser and normal user passwords.

Two access methods to the Solo E1 DSU(s) are available (using a terminal connected to the **COMM** port or a telnet connection from a remote terminal). The security of your network depends on proper authorization:

• If you set only one password, both Superuser and user passwords become the same.

• As Superuser, this user can gain exclusive control of the terminal interface.

• A "no passwords" situation gives any user logging on Superuser access rights. If any user sets one password, both passwords become the same and are known only to that user. The result is one user gaining exclusive control of the Solo E1 DSUs.

**NOTE:** Digital Link recommends that you set both passwords.

## Setting Password Protection for the Terminal Interface

When you log on to the Solo E1 DSU for the first time, set the Superuser and the user password parameters (case-sensitive) in Menu-8 Alarm II.

The default value is an empty text string. No password is required to log on for the first time. If you do not set a password for either parameter, any user can access the Solo E1 DSU.

You can set both password parameters or only the Superuser password. If you set only Superuser password, the Solo E1 DSU sets the user password to the Superuser password.

Having the Superuser password allows you to set or change the passwords (refer to ).

Configuring Password Protection:

Go to Menu-8 - Alarms II.

Highlight the `Miscellaneous Mgmt. Config.` option and press Enter.

```
Normal User Password          *

Superuser Password            *
```

Move cursor down to the `Normal User` or `Superuser Password` asterisk (*) to highlight the field you want to change.

Press Enter, then you will get the receive the following message:

```
Please enter a password [10 characters max]?
```

Type in the password (while you type this in, the asterisk (*) on the screen remains unchanged). Press Enter.

Then you will receive the message:

```
Please retype password:
```

Type the password again, the press Enter. You will then be asked:

```
Do you really want to change the Password[Y/N]?
```

Press **y** and the password will be set.

The steps work the same for both Superuser and Normal User Password settings.

## User And Superuser Log On Rights

The Solo E1 DSU responds depending on who (user or Superuser) is logged on. The Superuser always has access to the Solo E1 DSU, and disconnects any user that is currently logged on to that Solo E1 DSU.

### *Superuser*

The Superuser has the rights to access Solo E1 DSU at anytime. If a user is logged on through telnet and the Superuser logs on, the Solo E1 DSU responds:

> The Terminal User Interface is already in use. Please enter the superuser password to force the other user to log off or type **<Ctrl-X>** and try again later.

Enter the Superuser password to log off the user, or press **Ctrl-X** to abort your log on attempt.

### *User*

Under general operations, use the user password to log on to the Solo E1 DSU. Should the Superuser log on, the Solo E1 DSU automatically closes the user connection. If the user attempts to log on, the Solo E1 DSU responds:

> The superuser is already logged on. Try again later.

## Using The Terminal Interface

```
SW Ver 2.1.c  MIB Ver 1.9    Digital Link SoloE1 Encore                5/18/98
HW Ver A                       Menu-1 Main Status                      11:11:11
                             Local:JD0138            Remote:JD0008
                             ------------            -------------
   Unit Status                     Normal                   Normal

   Network Status                  Normal                   Normal


   DATA DTE Status          Loss Of Signal          Loss Of Signal
   Alarm Input Status              Normal                   Normal

   Error Free Seconds              100.0%                   100.0%
   Errored Seconds Ratio             0.0%                     0.0%
   Severely Errored Seconds Ratio    0.0%                     0.0%
   Background Block Error Ratio      0.0%                     0.0%
   CRC4 Errors                        0                        0
   Code Violations                    0                        0


 -------------------------------------------------------------------------
 0-SNMP Config.   1-Main Status    2-Data Status   3-Reports   4-Main Config.
 5-Data Config.   6-Timeslot Config.  7-Alarm I    8-Alarm II  9-Diagnostics

 C-clears the counters                                              _
```

Figure 3-1    Menu-1 Main Status

To access a menu, enter the code (press one of the 0, 1, 2, 3, 4, 5, 6, 7, 8, or 9 keys) for that menu. Modify information in the menus that appears in bold-face. The arrow keys provide movement through the settings and also offer choices for each setting.

To redraw the screen anytime, press Ctrl-l (control-lowercase L for refresh).

When you log on, the Solo E1 DSU displays Menu-1 Main Status (Figure 3-1). (Refer to "Menu-1 Main Status" on page 4-2 for more information.)

Table 3-1    Navigation Keys

| Keys | Use to: |
| --- | --- |
| Arrow | Navigate a parameter choice. |
| Number | Choose a menu, or (if in Diagnostics) a test. |
| Ctrl-X | End session. |
| Alphanumeric | Suggest a parameter, enter a Unit ID, Time, Date, etc. |
| Return | Accept a change, or edit a parameter. |

**NOTE:** The **u** (up), **d** (down), **r** (right), and **l** (left) keys also function as arrow keys. If a remote unit is connected, the **r** and **l** key functions are changed to move the cursor from the remote (**r**) to local (**l**) fields. Use the up (**u**) and down (**d**) keys to move within the respective unit field items.

## Setting a Parameter

To set or change a parameter:

1. **Choose the menu.**

2. **Use the up and down arrow keys to move to the value you want to change.**

   If you want to access the time and date field, you must use the right and left arrow in Menu-4.

3. **Press Return to activate edit mode (the field blinks).**

4. **Use the up or down arrow keys to cycle through the available options.**

5. **Choose the desired option by pressing the Return key to select that option.**

6. **If prompted to confirm your action, type    y.**

   If you type any other key, your action is denied. If you use the escape (ESC) key, you will leave the field unchanged.

To access the functions and features, the Solo E1 DSU uses the menus shown in Table 3-2.

Table 3-2   Solo E1 DSU Terminal Interface Menus

| Menu | Function | Description Reference |
|------|----------|----------------------|
| 0 | SNMP Configuration | "Menu-0 SNMP Configuration" on page 3-15 |
| 1 | Main Status | "Menu-1 Main Status" on page 4-2 |
| 2 | Data Status | "Menu-2 Data Status" on page 4-5 |
| 3 | Performance Reports | "Check Efficiency with Menu-3 Performance Reports" on page 4-6 |
| 4 | Main Configuration | "Basic Parameters Using Menu-4 Main Configuration" on page 3-7 |
| 5 | Data Configuration | "Configuring the DATA Port" on page 3-11 |
| 6 | Timeslot Configuration | "Allocating Timeslots" on page 3-12 |
| 8 | Alarm II | "Menu-8 Alarm II Configurations" on page 3-19 |
| 9 | Diagnostics | "Running A Diagnostic" on page 5-1 |

### First time configuration for local or remote

Set the items in this order for proper functionality:

1. Unit ID, Date, Time and E1 network parameters

2. **DATA** port parameters

3. Timeslot allocations

4. SNMP parameters (if required)

5. Alarm conditions, thresholds, and passwords

## Basic Parameters Using Menu-4 Main Configuration

To configure the basic parameters, use Menu-4 Main Configuration (Figure 3-2). The content of this menu depends on the Solo E1 DSU configuration.

```
SW Ver 2.1.c  MIB Ver 1.9     Digital Link SoloE1 Encore              6/02/98
HW Ver A                      Menu-4 Main Configuration               15:17:10
S/N                                  Local:JD0034            Remote:JD0008
                                     ------------            --------------
UNIT    Protect Mode                      Disabled                 Disabled
        Idle Code                             0xFF
NET     Framing                        CRC4 Enabled             CRC4 Enabled

        Main/Alt Sync.                     NET/int                  NET/int
        In-Band Communications Bit               4                        4




        ------------------------------------------------------------------------
        0-SNMP Config.   1-Main Status    2-Data Status   3-Reports    4-Main Config.
        5-Data Config.   6-Timeslot Config. 7-Alarm I     8-Alarm II   9-Diagnostics
        E-Flash Download
        CR-changes a selection            Arrow Keys-move the selection
```

Figure 3-2    Menu-4 Main Config.

Table 3-4 describes the parameters of Figure 3-2.

**NOTE:** In the `Main/Alt Sync.` parameter, the uppercase letters indicate which clock is currently in use; lowercase indicates the clock not in use. Clocking sources vary depending on your network, be sure to check this or you will experience problems.

## Setting Unit ID

1. **Activate Terminal mode by setting switch S2-12 UP (ON).**



Figure 3-3    Dip Switch 12 Up

2. **Press 4 to go to Menu-4 Main Configuration.**

3. **Use the arrow keys to move to the ID field.**

4. **Press the Return key to start edit mode.**

   The field blinks and at the bottom of the screen you will type a unit ID when this prompt appears.

   ```
   Please Enter an ID [6 characters max]:
   ```

   The ID accepts up to 6 alphanumeric characters but cannot begin with a number. The default ID is a version of the Solo E1 DSU serial number.

5. **Press the Return key, then you will be prompted with the following:**

   ```
   Do you really want to change the Configuration [Y/N]?
   ```

6. **Type  y to accept the new ID.**

## Setting Date or Time

To set the date and time:

1. **Move to the date field using the right arrow or r key. Use the up or down arrow key to move between date and time.**

2. **Press Return to activate edit mode.**

   ```
   Please enter a date [mm/dd/yy]

   Please enter a time [hh:mm:ss]
   ```

3. **Type the date or time.**

   For example, entering 8/16/94 yields 08/16/94 or 2:46:7 yields 02:46:07 (The clock is a 24-hour clock.)

4. **At the prompt, press   y to set the date or time. You must use the right or left arrow key to move out of this feature set.**

**NOTE:** The menu clock is reset to a predetermined value each time you power up or a reset after a software download. After power interruption or reset, you must reset the correct time and date.

## Configuring Network Parameters

Net Framing needs to match settings on local and remote, otherwise the remote unit settings are not visible. The factory setting is set to CRC4 enabled.

In-band bit must match on the local and remote units. The factory setting default is 4.

If changing Frame or Inband settings, change remote first. The remote will temporarily disappear. Then change the local unit to match the new parameter and the remote unit will reappear.

Table 3-3    Menu-4 Main Config. Parameters

| Parameter (Default) | Settings | Description |
| --- | --- | --- |
| UNIT Protect Mode (Disabled) | Enabled Disabled | Enabled—locks out access to the front panel. Disabled—you can run tests from the front panel. |
| UNIT Idle code (0XFF) | Hex value | Choose any hex value between 0x00 and 0xFF |
| NET Framing (CRC4 Enabled) | CRC4 Enabled CRC4 Disabled Unstructured | • CRC4 Enabled—uses Cyclic Redundancy Check 4. Performs a CRC calculation and uses 4 frame bits to store the CRC over the content of the frame. • CRC4 Disabled—Does not count CRCs. • Unstructured does not support G.704 framing or CRC multi-framing. |
| Main/Alt Sync. (NET/int) | net int data01 ext[2048] | Select the clock source for the E1 network transmitter. Specify the Main clock source, then the Alternate. (Each clock source offers the same options.) If the network is the clock source, select NET. If the clock source is DTE, select DATA. |
| In-Band Communications Bit (4) | 4 5 6 7 8 Disabled | Select a national bit (from 4 to 8) in timeslot 0 for the in-band 4Kbps communications link with the remote unit. If this feature is disabled, all national bits are set to 1. |

# Configuring the DATA Port

To configure the DATA port, select Menu-5 Data Configuration (Figure 3-4).

```
SW Ver 2.1.c  MIB Ver 1.9     Digital Link SoloE1 Encore            5/18/98
HW Ver A                      Menu-5 Data Configuration             11:46:20
              Local:JD0138                        Remote:JD0008
           ----------------------------          ----------------------------
           Loss  Mode Format   Clock           Loss  Mode Format   Clock
DATA1      RTS   DCE   V.35    +SCT            RTS   DCE   V.35    +SCT




           -----------------------------------------------------------------
           0-SNMP Config.   1-Main Status     2-Data Status   3-Reports    4-Main Config.
           5-Data Config.   6-Timeslot Config. 7-Alarm I      8-Alarm II   9-Diagnostics

           CR-changes a selection            Arrow Keys-move the selection
```

Figure 3-4    Menu-5 Data Config.

Table 3-4 describes the parameters of Figure 3-4.

Table 3-4   Menu-5 Data Config.

| Parameter (Default) | Settings | Description |
|---|---|---|
| Loss (RTS) | DTR RTS None | Select the criteria for detecting loss of signal on the **DATA** port. The loss appears when detected by the Solo E1. |
| Mode (DCE) | DTE DCE | Configure the **DATA** port as a DTE (Data Terminal Equipment) or a DCE (Data Circuit Equipment). |

Table 3-4   Menu-5 Data Config.

| Parameter (Default) | Settings | Description |
|---|---|---|
| Format (V.35) | X.21 V.35 | Select V.35 or X.21 operation. |
| Clock (+SCT) | +SCT -SCT SCTE | For DTE timing, select SCT. You can invert the clock (-SCT) or not (+SCT). Use SCT inversion (-SCT) or SCTE to correct delays in clocking due to cable length. When the **DATA** port is a DTE, SCTE is the only **DATA** port timing option. |

## Allocating Timeslots

The default factory network timeslot allocation for bandwidth is 31 DS0 timeslots allocated to DATA port 1 (Figure 3-5):

- Allocate by Port—displays allocated timeslots for one port at a time only.

- Network Time Slot Map displays the entire timeslot configuration.

- The default factory allocation appears in Allocate by Port as: DATA01 TS01-TS31 1984Kb/s

**NOTE:** Navigate these fields with the arrow keys. To edit a field, navigate to that field, and press the Return key to activate Edit mode. Make your selection and press the Return key again to set that choice.

In some cases, the Solo E1 DSU requests that you confirm your action. Type *y* to do so, or any other key to stop the process.

### Allocation Methods

Select the allocation method in the Allocation Type field:

- Contiguous (default)—Allocate timeslots in a contiguous order.

- Manual—The manual method allows you to allocate timeslots in an arbitrary random order.

```
┌─────────────────────────────────────────────────────────────────────┐
│ SW Ver 2.1.c  MIB Ver 1.9    Digital Link SoloE1 Encore      5/18/98 │
│ HW Ver A                  Menu-6 Timeslot Configuration      11:46:35 │
│                  Local:JD0138                    Remote:JD0008        │
│                  ────────────                    ────────────        │
│ Allocation Type   Contiguous                      Contiguous         │
│                                                                      │
│ Allocate by port:                                                    │
│                  DATA01 TS01-TS31   1984Kb/s      DATA01 TS01-TS31   1984Kb/s │
│                                                                      │
│                                                                      │
│ Allocate by timeslot:                                                │
│                         Network Time Slot Map                        │
│            1   2   3   4   5   6   7   8   9   10  11  12  13  14  15  16 │
│ Local    D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 │
│ Remote   D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 │
│                                                                      │
│            17  18  19  20  21  22  23  24  25  26  27  28  29  30  31 │
│ Local    D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 │
│ Remote   D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 │
│ ──────────────────────────────────────────────────────────────────── │
│ 0-SNMP Config.    1-Main Status      2-Data Status   3-Reports    4-Main Config. │
│ 5-Data Config.    6-Timeslot Config. 7-Alarm I       8-Alarm II   9-Diagnostics  │
│                                                                      │
│ CR-changes a selection            Arrow Keys-move the selection    _ │
└─────────────────────────────────────────────────────────────────────┘
```

Figure 3-5    Menu-6 Timeslot Config. in Default Mode

## Allocating Contiguous Timeslots

In this example, we allocate DATA port 1, slots 1 through 14, and start with the default status—the allocation mode is Contiguous.

To allocate DATA port 1—slots 1 through 14:

1.  **Set Allocation Type to Contiguous:**

    a.  **Select Allocation Type.**

    Use the arrow keys to move to this field.

    b.  **Press the Return key to activate edit mode.**

    c.  **Select** `Contiguous.`

    Use the up/down arrow keys. Press the Return key to choose Contiguous. Type **y** to confirm this action.

2.  **Allocate by Port:**

    a.  **Select the** `Allocation by Port` **parameter.**

    Use the arrow keys to move to this field.

b.  **Press the enter key to activate edit mode.**

```
Type a port number (NN for a data port, I for Idle, or the
UP or Down arrow):
```

c.  **Type 1**

For DATA port 1. (You can specify only port 1.)

d.  **Press the enter key.**

Menu-6 displays DATA01 in Allocate by Port (first field).

At the bottom of the screen you will see:

```
Type the start timeslot (NN), or 0, or I for IDLE or the UP
or DOWN arrows:
```

3.  **Set the start and end timeslots:**

a.  **Type 1 and press the enter key to set the start timeslot to 1.**

Menu-6 displays DATA01 TS01. The end timeslot field blinks.

```
Please type the end timeslot (NN):
```

b.  **Type 14, press the enter key, and type y to set the end timeslot to 14.**

Allocate by Port displays DATA01    TS01-TS14    896 Kb/s

timeslots 1 through 14 are allocated to port 1; all other slots are idle.

**OR**

If a remote unit is attached, you will get the following message:

```
Do you want to change the local unit, the remote, or both
(L, R, or B):
```

i.  **Press r for remote.**

Do you really want to change the configuration? [Y/N]

c.  **Press y for yes.**

## Allocating Timeslots Manually

In this example, you will set timeslot to Idle mode. All timeslot are configured individually using the same procedure.

1.  **Edit the Allocation Type parameter.**

a. **Select** `Manual.`

> `Do you really want to change the configuration [Y/N]?`

b. **Select  y for yes.**

2. **Allocate by timeslot:**

a. **Press enter to select**  `timeslot 1.`

This highlights `Local D01` on the `Network Time Slot Map.`

3. **Press enter, and  D01 will begin blinking.**

> `Type the UP or DOWN arrows to change the selection, or type`
> `a port number (NN or I for IDLE):`

4. **Type  i (for IDLE)**

Timeslot 1 displays a dashed line starts to blink.

a. **Press enter and then you receive the prompt:**

> `Do you really want to change the configuration [Y/N]?`

5. **Type  y for yes.**

## Menu-0 SNMP Configuration

To configure the Solo E1 DSU for SNMP management capability, use Menu-0 SNMP Config.

Have an IP address for the Solo E1 DSU and the NMS (Network Management Station) that receives TRAP messages.

The GET, SET, and TRAP community strings function as passwords, and prevent another SNMP management station from gaining access to the Solo E1 DSU.

```
SW Ver 2.1.c  MIB Ver 1.9    Digital Link SoloE1 Encore              5/18/98
HW Ver A                        Menu-0 SNMP Config                   12:33:06
                             Local:JD0138                       Remote:JD0008
                             ------------                       ------------
UNIT  SNMP                     Disabled                           Disabled
      IP Address              0.0.0.0                            0.0.0.0
      IP Mask                 0.0.0.0                            0.0.0.0
      Forward Over IBC        Disabled                           Disabled

TRAP  1st NMS IP Address      0.0.0.0                            0.0.0.0
      2nd NMS IP Address      0.0.0.0                            0.0.0.0
      3rd NMS IP Address      0.0.0.0                            0.0.0.0
      Output Port                COMM                               COMM

Community Strings
      Get                     public                             public
      Set                     public                             public
      Trap                    public                             public

-----------------------------------------------------------------------------
0-SNMP Config.    1-Main Status      2-Data Status    3-Reports    4-Main Config.
5-Data Config.    6-Timeslot Config. 7-Alarm I        8-Alarm II   9-Diagnostics

CR-changes a selection           Arrow Keys-move the selection          _
```

Figure 3-6    Menu-0 SNMP Config.

Table 3-5 describes the parameters of Figure 3-6.

Table 3-5   Menu-0 SNMP Config. Parameters

| Parameter (Default) | Settings | Description |
|---|---|---|
| UNIT SNMP (Disabled) | Enabled Disabled | Enabled—Enables the NMS. Disabled—The NMS is not used. |
| IP Address (0.0.0.0) | nnn.nnn.nnn.nnn | nnn—0 through 255 |
| IP Mask (0.0.0.0) | nnn.nnn.nnn.nnn | nnn—0 through 255 |
| Forward Over IBC (Disabled) | Enabled Disabled | Enabled—Enables the automatic forwarding of SNMP packets over the in-band communication link from the local solo E1 to the remote unit. |

Table 3-5    Menu-0 SNMP Config. Parameters (Continued)

| Parameter (Default) | Settings | Description |
|---|---|---|
| TRAP NMS IP Address (0.0.0.0) (applies to 1st, 2nd and 3rd TRAPS) | nnn.nnn.nnn.nnn | nnn—0 through 255. Enter the IP address of the NMS (Network Management Station) that will receive trap messages from the Solo E1 DSU SNMP agent. (Note: If all the TRAP NMS IP addresses are set, the Solo E1 sends a trap to all three network management servers.) |
| TRAP Output Port (COMM) | COMM IBC | Select the port that the Solo E1 DSU SNMP agent uses to send TRAP messages to the NMS. |
| Get (public) | text string | Enter an alphanumeric text string (maximum—32 characters). The Solo E1 DSU SNMP agent uses this text string to check GET requests for the SNMP configuration from the NMS. |
| Set (public) | text string | Enter an alphanumeric text string (max—32 characters). The Solo E1 DSU SNMP agent uses this text string to check SET requests from the NMS to set the SNMP configuration. |
| Trap (public) | text string | Enter an alphanumeric text string (maximum—32 characters). The Solo E1 DSU SNMP agent inserts in SNMP TRAPs it sends to the NMS. |

# Menu-7 Alarm I Conditions

Alarm conditions are categorized as network and DATA port alarm conditions. Alarm conditions affecting network or DATA port signals are reported on the terminal user interface and through SNMP.

For information on reports and event logs, refer to .

The Solo E1 DSU recognizes and reports the following network alarm conditions:

- Loss of carrier signal
- Loss of network synchronization
- Threshold violations
- Unframed All Ones
- Remote Alarm Indication

DATA port alarm condition recognizes and reports the loss of DTE, by setting the Solo E1 DSU to recognize loss of RTS or loss of DTR.

Use Menu-7 Alarm I to set the alarm conditions (Figure 3-7).

```
SW Ver 2.1.c  MIB Ver 1.9    Digital Link SoloE1 Encore              5/18/98
HW Ver A                        Menu-7 Alarm I                       11:46:43
                               Local:JD0138              Remote:JD0008
                               ------------              -------------
Block All Alarms                       No                          No
  NET Carrier Loss Alarm            Enabled                     Enabled
  NET Sync Loss Alarm               Enabled                     Enabled
  NET UA1 Received Alarm            Enabled                     Enabled
  NET RAI Received Alarm            Enabled                     Enabled



  DATA DTE Signal Loss Alarm        Enabled                     Enabled
  CV Threshold Alarm                Disabled                    Disabled
  CRC Threshold Alarm               Disabled                    Disabled


------------------------------------------------------------------------------
0-SNMP Config.   1-Main Status      2-Data Status   3-Reports    4-Main Config.
5-Data Config.   6-Timeslot Config. 7-Alarm I       8-Alarm II   9-Diagnostics

CR-changes a selection            Arrow Keys-move the selection              _
```

Figure 3-7    Menu-7 Alarm I

Setting alarm I parameters is optional.

Table 3-6 describes the parameters of Figure 3-7.

Table 3-6   Menu-7 Alarm I Parameters

| Parameter (Default) | Settings | Description |
|---|---|---|
| Block All Alarms (No) | Yes<br>No | Yes—Blocks the reporting of alarms.<br>No—Enables the Solo E1 to report alarms. |
| NET Carrier Loss Alarm (Enabled) | Enabled<br><br>Disabled | Enabled—The Solo E1 generates an alarm when a Network Carrier Loss of Signal occurs.<br>Disabled—Disables the function. |
| NET Sync Loss Alarm (Enabled) | Enabled<br><br>Disabled | Enabled—The Solo E1 generates an alarm when a Network Sync Loss occurs.<br>Disabled—Disables the function. |

Table 3-6   Menu-7 Alarm I Parameters (Continued)

| Parameter (Default) | Settings | Description |
|---|---|---|
| NET UA1 Received Alarm (Enabled) | Enabled<br><br>Disabled | The NET UA1 device detects unframed all ones from network.<br>Enabled—Device detects a NET UA1, it generates an alarm.<br>Disabled—Disables the alarm. |
| NET RAI Received Alarm (Enabled) | Enabled<br><br>Disabled | (RAI—Remote Alarm Indication)<br>Enabled—The Solo E1 generates an alarm when it receives an RAI.<br>Disabled—disables the function. |
| DATA DTE Signal Loss Alarm (Enabled) | Enabled<br><br>Disabled | Enabled—The Solo E1 generates an alarm when a DATA DTE Signal Loss occurs.<br>Disabled—Disables the function. |
| CV Threshold Alarm (Disabled) | Enabled<br>Disabled | (CV—Code Violation). $A \times 10^B$<br>Set A and B in $A \times 10^B$. Maximum threshold is $6 \times 10^{-3}$; minimum threshold is $2 \times 10^{-8}$. Example: $6 \times 10^{-6}$. When the rate of CVs exceed the set threshold, the device generates an alarm. |
| CRC Threshold Alarm (Disabled) | Enabled<br>Disabled | (CRC—Cyclic Redundancy Check). $A \times 10^B$<br>Set A and B in $A \times 10^B$. Maximum threshold is 1, minimum threshold is $5 \times 10^{-5}$. Example: $3 \times 10^{-2}$. When the CRCs exceed the set threshold, the device generates an alarm. |

## Menu-8 Alarm II Configurations

When you choose Menu-8, the Solo E1 DSU standalone shows these sub-menu choices. The module version shows an additional sub-menu choice called External Alarm Configuration. (Figure 3-8).

```
SW Ver 2.1.c  MIB Ver 1.9    Digital Link SoloE1 Encore          5/18/98
HW Ver A                     Menu-8 Alarm II                    11:46:52




        Please select a menu:


              Miscellaneous Management Configuration
              Modem Initialization Strings








--------------------------------------------------------------------------------
0-SNMP Config.   1-Main Status     2-Data Status   3-Reports    4-Main Config.
5-Data Config.   6-Timeslot Config. 7-Alarm I      8-Alarm II   9-Diagnostics

CR-selects a menu                   Up/Down Arrow Keys-move the selection   _
```
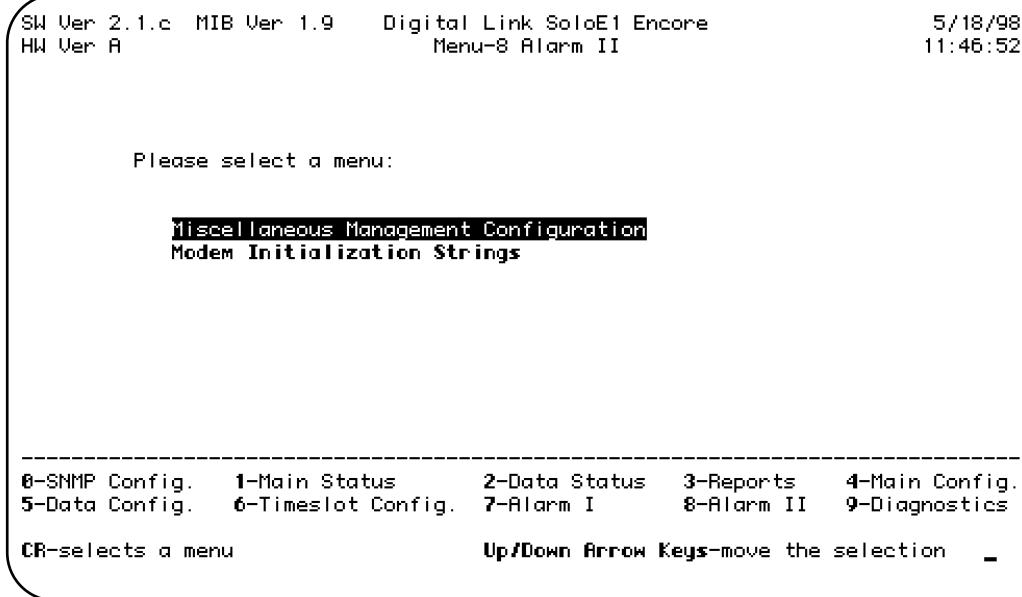
Figure 3-8    Menu-8 Alarm II

## External Alarm Configuration (Module only)

Use External Alarm Configuration to define external alarm parameters
(Figure 3-9).

Use Menu-8 Alarm II to set:

- External alarm setup (shelf only)
- Connection
- Timeout
- Dial out telephone number(s)
- Passwords
- **COMM**  port DCD
- XON/XOFF
- Modem INIT strings

```
SW Ver 2.0G    MIB Ver 1.9    Digital Link Ensemble E1 DSU Card        2/05/96
HW Ver A       Slot # 10           Menu-8 Alarm II                    01:13:09
                              External Alarm Configuration
                                   Local: E1S10
                                   ------------
External Alarm Input Indication          Disabled
External Alarm Input Contacts         Normally Open
External Alarm Input Message

External Alarm Output Indication         Disabled
External Alarm Output Contacts        Normally Open




---------------------------------------------------------------------------
0-SNMP Config.    1-Main Status      2-Data Status    3-Reports    4-Main Config.
5-Data Config.    6-Timeslot Config. 7-Alarm I        8-Alarm II   9-Diagnostics

CR-changes a selection            Arrow Keys-move the selection        ▮
```

Figure 3-9    Menu-8 Alarm II—Ext. Alarm Config.

Table 3-7 describes the parameters of Figure 3-9.

Table 3-7   Ext. Alarm Config. Parameters

| Parameter (Default) | Setting | Description |
|---|---|---|
| External Alarm Input Indication (Disabled) | Enabled Disabled | Enabled—Enables the alarms reception from an external source (such as a door opening or a temperature alarm). |
| External Alarm Input Contacts (Normally Closed) | Normally Open Normally Closed | Select according to how the mechanism from the external source (such as a door opening or a temperature alarm) is set. |

Table 3-7   Ext. Alarm Config. Parameters

| Parameter (Default) | Setting | Description |
|---|---|---|
| External Alarm Input Message | 20 characters maximum | Enter an alarm message to display when an external alarm occurs. External Alarm Input Indication must be enabled and External Alarm Input Contacts must be properly set. |
| External Alarm Output Indication (Disabled) | Enabled Disabled | Enabled—enable a device, connected to the ALARM OUT connector (such as a bell or light) to announce an alarm. |
| External Alarm Output Contacts | Normally Open | This a read-only field. |

## Miscellaneous Management Configuration

Use Miscellaneous Management Configuration to define external communications parameters.

```
SW Ver 2.1.c  MIB Ver 1.9    Digital Link SoloE1 Encore           5/18/98
HW Ver A                         Menu-8 Alarm II                   11:46:59
                       Miscellaneous Management Configuration

                                 Local:JD0138                  Remote:JD0008
                                 ------------                   -------------
Connection                            Direct                        Direct
Timeout When Logged On              Unlimited                     Unlimited
Timeout When Not Logged On          Unlimited                     Unlimited
Phone Number 1
Phone Number 2
Normal User Password                    *                             *
Superuser Password                      *                             *
COMM    DCD                          Disabled                      Disabled
        XON/XOFF                     Disabled                      Disabled

DLC IBC Link Loss Alarm               Enabled                       Enabled
Dial Out Time Interval                0 Min.                        0 Min.

---------------------------------------------------------------------------
0-SNMP Config.    1-Main Status     2-Data Status   3-Reports   4-Main Config.
5-Data Config.    6-Timeslot Config. 7-Alarm I      8-Alarm II  9-Diagnostics

CR-changes a selection          Arrow Keys-move the selection          _
```

Figure 3-10  Menu-8 Alarm II—Misc. Mgmt. Config.

Table 3-8 describes the parameters of Figure 3-10.

Table 3-8   Menu-8 Alarm II Parameters

| Parameter (Default) | Settings | Description |
|---|---|---|
| Connection (Direct) | Direct Modem In-Band Comm | Direct—connection through a null modem Modem—connection through a modem IBC—connection through IBC. |
| Timeout When Logged On (Unlimited) | 1 min 10 min 30 min Unlimited | Select a time option. Applies only when you are logged on. If the Solo E1 DSU does not detect terminal activity after the specified time span has elapsed, the Solo E1 DSU warns that log off is in 30 seconds. |
| Timeout When Not Logged On (Unlimited) | 1 min 10 min 30 min Unlimited | Select a time option. Applies only when you are connected through a modem and not logged on. When the Solo E1 DSU does not detect terminal activity when the specified time span has elapsed, the Solo E1 DSU closes the connection. Recommend—1 min |
| Phone Number 1 (empty text string) | | Enter a unique, valid Hayes-modem dial string. |
| Phone Number 2 (empty text string) | | Enter a unique, valid Hayes-modem dial string. If this fails, the Solo E1 DSU waits five minutes then automatically tries the first number and repeats this pattern until connected. |
| Normal User Password (empty text string) | | Use a unique text string. Enter a password (10 characters maximum, case sensitive). As you type, asterisks appear. |
| Superuser Password (empty text string) | | Use a unique text string. Enter a password (10 characters maximum, case sensitive). As you type, asterisks appear. |
| **COMM** Port DCD (Disabled) | Enabled Disabled | Enabled—drops DCD (Data Carrier Detect signal) to close the connection. If your modem does not use DCD, set to Disabled. |
| **COMM** Port XON/XOFF (Disabled) | Disabled | Disables XON/XOFF. |
| | XOFF until ANY | Use Ctrl-S to stop data flow from remote Solo E1 DSU, and any key to resume flow. |
| | XOFF until XON | Use Ctrl-S to stop data flow from remote Solo E1 DSU, and Ctrl-Q to resume flow. |

Table 3-8   Menu-8 Alarm II Parameters  (Continued)

| Parameter (Default) | Settings | Description |
|---|---|---|
| DLC IBC Link Loss Alarm (Enabled) | Enabled | When enabled, an alarm alerts loss of IBC. |
|  | Disabled |  |
| Dial Out Time Interval (0 min.) | 0 to 255 minutes | Use to extend time interval before modem dials out. |

## Modem Initialization Strings

To initiate a modem connection, the Solo E1 DSU sends +++ followed by the first modem initialization string. The Solo E1 DSU waits for the modem response. The Solo E1 DSU waits for modem response so that it can guard against the possibility of losing the characters right after the modem reset command. After receiving the modem response, the Solo E1 DSU sends the second initialization string (if programmed).

**NOTE:** The Solo E1 DSU assumes that the modem always sends a response; do not program the modem to override the response.

Figure 3-11 shows the Menu-8 Alarm II.

```
SW Ver 2.1.c  MIB Ver 1.9   Digital Link SoloE1 Encore        5/18/98
HW Ver A                    Menu-8 Alarm II                   11:47:11
                      Modem Initialization Strings

 Local
     String 1  ATE0V0Z0
     String 2  ATV0E0Q0F1C1S0=1S2=43S3=13S4=10S7=30S12=50&C1&D0

 Remote
     String 1  ATE0V0Z0
     String 2  ATV0E0Q0F1C1S0=1S2=43S3=13S4=10S7=30S12=50&C1&D0




-------------------------------------------------------------------------
0-SNMP Config.   1-Main Status    2-Data Status   3-Reports   4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Alarm I     8-Alarm II  9-Diagnostics
CR-changes a value
Up/Down Arrow Keys-move the selection            F-default modem strings _
```

Figure 3-11   Menu-8 Alarm II—Modem INIT Strings

If you use the modem reset command, set all parameters up to the reset command as the first modem initialization string. Set the rest of the commands as the second modem initialization string.

## Remote Solo E1 DSU-Modem Connection

Use Menu-8 Alarm II to set the Solo E1 DSU to report alarms to a remote terminal (through a modem connection):

- Connection—Modem
- **COMM** port DCD—Enabled
- Set Phone Number 1 and Phone Number 2 with unique, valid Hayes-modem dial strings.

**NOTE:** If your modem does not pass the Data Carrier Detect (DCD) signal, set the **COMM** port DCD to Disabled.

# $\equiv 4$     *Maintenance*

This chapter discusses maintenance methods for the Solo E1 DSU:

The Solo E1 DSU collects and displays performance data to help you manage and troubleshoot problems on the network. It monitors the line continuously and displays the data on a terminal screen.

You can monitor and manage the Solo E1 DSU:

- From an ANSI terminal
- A Telnet connection
- An SNMP network management station (NMS) connected to the **COMM** port.

The front panel LEDs also show the Solo E1 DSU status (refer to "Installing the Module" on page 2-18).

Monitor the status of the Solo E1 DSU from Menu-1 Main Status and the status of the single **DATA** port from Menu-2 Data DTE Status.

Use the menus to troubleshoot the Solo E1 DSU:

- Menu-1 Main Status—displays Solo E1 DSU status
- Menu-3 Performance Reports—displays carrier and user registers, and the event log.
- Menu-9 Diagnostics—to verify connections and circuits and troubleshoot problems (refer to Figure 5-1 on page 5-2).

## How Alarms Are Reported and Displayed

The Solo E1 DSU always reports all alarm conditions to either:

- The device connected to its **COMM** port (such as a terminal, printer, or modem).

- The device connected to the **COMM** port of the remote device if Connection is set to IBC (in Menu-8 Alarm II) on the local device.

If SNMP is enabled, SNMP TRAPs are sent as configured in Menu-0 SNMP Configuration (see Figure 3-6 on page 3-16); otherwise, the connection indicated in Menu-8 Alarm II (see Figure 3-10 on page 3-22) identifies the alarms' are sources.

If SNMP is not enabled, the alarm shows up at the bottom of the screen and scrolls. The alarm automatically goes away when the screen is refreshed.

When the terminal is connected to the **COMM** port and you are logged on, alarms are shown at the bottom of the screen (but above the menu choices). For example, a carrier loss condition on the **DATA** port shows as (if the device is set to use SNMP, all information passes to the NMS):

```
--Local  ID:Oahu  Data1 Carrier Loss   Start: 07:17:37
1/12/97
```

The alarm information is:

- Local or remote device
- Unit ID
- Type of alarm
- Start or end of alarm condition
- Date and time.

The alarm remains on the screen until a new alarm occurs or until you select a new menu. When no alarm is present, a dotted line is shown.

In SNMP mode, the device sends the alarm as an SNMP TRAP to the NMS and it does not send file text to the screen.

If the local Solo E1 is connected to a modem and an alarm occurs, the Solo E1 causes the modem to dial out if in Menu-8 Alarm II (see Figure 3-10 on page 3-22) Connection is set to `Modem`; valid telephone numbers are set in `Phone Number 1` or `Phone Number 2`).

## Menu-1 Main Status

The Solo E1 DSU counts error conditions on the network and **DATA** ports (Figure 4-1).

```
┌─────────────────────────────────────────────────────────────────────┐
│ SW Ver 2.1.c  MIB Ver 1.9    Digital Link SoloE1 Encore      5/18/98  │
│ HW Ver A                       Menu-1 Main Status            11:11:11  │
│                              Local:JD0138              Remote:JD0008   │
│                              ------------              -------------   │
│     Unit Status                    Normal                    Normal   │
│                                                                       │
│     Network Status                 Normal                    Normal   │
│                                                                       │
│                                                                       │
│     DATA DTE Status         Loss Of Signal          Loss Of Signal   │
│     Alarm Input Status             Normal                    Normal   │
│                                                                       │
│     Error Free Seconds             100.0%                   100.0%    │
│     Errored Seconds Ratio            0.0%                     0.0%    │
│     Severely Errored Seconds Ratio   0.0%                     0.0%    │
│     Background Block Error Ratio     0.0%                     0.0%    │
│     CRC4 Errors                         0                        0    │
│     Code Violations                     0                        0    │
│                                                                       │
│ ------------------------------------------------------------------    │
│ 0-SNMP Config.    1-Main Status    2-Data Status   3-Reports   4-Main Config. │
│ 5-Data Config.    6-Timeslot Config.  7-Alarm I    8-Alarm II  9-Diagnostics  │
│                                                                       │
│ C-clears the counters                                          _      │
└─────────────────────────────────────────────────────────────────────┘
```

Figure 4-1    Menu-1 Main Status

During testing, Menu-1 Main Status displays the test status. All parameters in Menu-1 are read-only. When you clear the counters:

• Seconds in Current 15 minutes continues to count.
• Error Free Seconds returns to 100%.
• Network Status is cleared of exceeded threshold messages.
• The 24-hour archive does not change.
• Values for CRC Errors and Code Violations are set to 0.

To clear the counters type **c**, then **y** to confirm. (Press any other key to abort.)

Any status related to the counters may take up to a minute to clear.

## Unit Status

Unit Status shows if the Solo E1 DSU is operating normally or if a special conditions exists.

Table 4-1    Unit Status

| Condition | Description |
|-----------|-------------|
| Normal | No abnormal conditions exist. |
| Self Test | Unit is running self test. |

Table 4-1   Unit Status   (Continued)

| Condition | Description |
|---|---|
| DTE Loopback (full or fraction) | Unit is in DTE loopback. |
| Net Loopback (full) | Unit is in network loopback. |
| PLD Loopback (full or fraction) | Unit is in payload loopback. |
| Send User 1 (full or fraction) | Unit is sending User 1 pattern. |
| Send User 2 (full or fraction) | Unit is sending User 2 pattern. |
| Send 1:1 (full or fraction) | Unit is sending alternate 1s and 0s pattern. |
| Send 1:2 (full or fraction) | Unit is sending standard loopdown remote code continuously. |
| Send 1:4 (full or fraction) | Unit is sending standard loopup remote code continuously. |
| Send 1:7 (full or fraction) | Unit is sending 1:7 pattern. |
| Send 3:24 (full or fraction) | Unit is sending 3:24 pattern. |
| Send QRW (full or fraction) | Unit is sending QRW code. |
| Send All 1s (full or fraction) | Unit is sending all ones signal. |
| Send All 0s (full or fraction) | Unit is sending all zeros signal. |
| LP UP Remote (full or fraction) | Unit is sending loopup code to remote unit for 15 seconds. |
| LP DN Remote (full or fraction) | Unit is sending loopdown code to remote unit for 15 seconds. |

### Network Status

Network Status indicates any abnormal conditions present on the received E1 signal.

Table 4-2   Network Status

| Condition | Description |
|---|---|
| Normal operation | No abnormal conditions exist. |
| Loss of Signal | Unit network signal is missing. |
| Loss of Frame | Unit network frame is missing. |
| RAI Received | Unit is receiving RAI. |
| CV Threshold Exceeded | CV threshold exceeded. |
| CRC Threshold Exceeded | CRC threshold exceeded. |
| UA1 Received | Unit is receiving UAI. |

Table 4-2   Network Status

| Condition | Description |
|---|---|
| Set Code Received | Unit is receiving a set code. |
| Reset Code Received | Unit is receiving a reset code. |

## *Error Statistics*

Default—Normal, default alarm status messages are displayed.

User-defined—enter up to 20 characters to replace the normal message.

Table 4-3   Menu-1 Alarm Input Status

| Parameter | Description |
|---|---|
| Error Free Seconds | The percentage of seconds the unit does not have errors. |
| Errored Seconds Ratio | Total number of errored seconds divided by all available seconds unit is operating up to a maximum of 24 hour intervals, then multiplied by 100. |
| Severely Errored Seconds Ratio | (Total number of severely errored seconds/24 hours total number of available seconds) *100 |
| Background Block Error Ratio | (Background block errors/number of available blocks)*100. Number of available blocks is (number of available seconds)*1000. |
| CRC4 Errors (Cyclic Redundancy Check) | An error checking scheme used to check the received data. The last 6 frame bits are calculated using the contents of the frame. The calculation is performed again when the frame is received and the CRC values are compared. If they do not match, the frame is considered bad and the CRC statistic is incremented. |
| Code Violations | An error checking scheme. A code violation occurs when the ones bit is not represented with the opposite signal of the previous ones bit. |

## Menu-2 Data Status

Menu-2 (Figure 4-2) shows the current status of the local and remote ports. If the local or remote device does not have a port in this position the parameter is blank.

```
/SW Ver 2.1.c  MIB Ver 1.9    Digital Link SoloE1 Encore         5/01/98  \
 HW Ver A                          Menu-2 Data Status                15:56:22

 Port    Local            Remote
 ------  ---------------  ---------------
 DATA1   Loss Of Signal   Loss Of Signal




 ---------------------------------------------------------------------------
 0-SNMP Config.   1-Main Status      2-Data Status    3-Reports    4-Main Config.
 5-Data Config.   6-Timeslot Config. 7-Alarm I        8-Alarm II   9-Diagnostics

\                                                                          _ /
```

Figure 4-2    Menu-2 Data DTE Status

### *DATA Status*

Data Status shows any abnormal conditions present on the received Data DTE signal on a DTE port.

Table 4-4   Data Status

| Parameter | Description |
|---|---|
| Normal Operation | No abnormal conditions exist. |
| Loss of Signal | Loss of DTR or RTS DTE lines, user defined. |

## Check Efficiency with Menu-3 Performance Reports

The Solo E1 DSU maintains counts of different error conditions on the network and on the **DATA** port. This information is maintained in ongoing counters as well as in a database that covers the performance of the service over the last 24 hours (separated into 96 intervals of 15 minutes).

Menu-3 Performance Reports provides access to (Figure 4-4):

• Performance Reports (Carrier and User Registers)

- Event Log—presents a log of information during the past 24-hour period.

Use the arrow keys to choose a menu and press the return key to go to that menu.

```
SW Ver 2.1.c  MIB Ver 1.9    Digital Link SoloE1 Encore        5/18/98
HW Ver A                     Menu-3 Performance Reports         11:07:49




        Please select a report:

            Carrier Registers, current interval
            Carrier Registers, total over 24 hours
            Carrier Registers, 24 hour detail
            User Registers, 24 hour detail
            Event Log




    -----------------------------------------------------------------------------
    0-SNMP Config.    1-Main Status       2-Data Status    3-Reports    4-Main Config.
    5-Data Config.    6-Timeslot Config.  7-Alarm I        8-Alarm II   9-Diagnostics

    CR-selects a report                   Up/Down Arrow Keys-move the selection   _
```

Figure 4-3    Menu-3 Performance Reports

## Carrier Registers, Current Interval

The Solo E1 DSU displays performance data for the most current 15-minute interval as shown in Figure 4-4.

```
SW Ver 2.1.c  MIB Ver 1.9    Digital Link SoloE1 Encore              5/18/98
HW Ver A                  Menu-3 Performance Reports                  11:14:48
                      Carrier Registers, Current Interval

                      Local:JD0138           Remote:JD0008
                      ------------           -------------
  Unavailable Signal State          No                     No


  Current Interval Timer           690                    698

  Errored Seconds (ES)               0                      0
  Unavailable Seconds (UAS)          0                      0
  Severely Errored Seconds (SES)     0                      0
  Background Block Error (BBE)        0                      0




---------------------------------------------------------------------------
0-SNMP Config.   1-Main Status      2-Data Status   3-Reports   4-Main Config.
5-Data Config.   6-Timeslot Config. 7-Alarm I       8-Alarm II  9-Diagnostics

                                                                         _
```

Figure 4-4    Menu-3 Perf. Reports—Carrier Reg., Cur. Interval

Table 4-5 describes the parameters shown in Figure 4-4.

Table 4-5   Carrier Registers, Current Interval Parameters

| Parameter | Description |
|---|---|
| Unavailable Signal State | Yes, when Unavailable Seconds counter is activated. No, otherwise. |
| Current Interval Timer | Counts number of seconds in current interval. |
| Errored Seconds (ES) | A second with one or more frame errors or CRC-4 errors. |
| Unavailable Seconds (UAS) | The number of seconds elapsed after 10 consecutive SES events are received. |
| Severely Errored Seconds (SES) | A second during which 300 or more CRC-4 violations or OOF events have occurred. |
| Background Block Error (BBE) | An errored block not occurring as part of an SES. |

## Carrier Registers, Total over 24 Hours

The Menu-3 Performance Reports, Carrier Registers, Total Over 24 Hours menu selection is the same as the previous menu except the time period is 24 hours. See Table 4-6 for parameter descriptions.

```
SW Ver 2.1.c  MIB Ver 1.9    Digital Link SoloE1 Encore          5/18/98
HW Ver A                   Menu-3 Performance Reports            11:48:40
                       Carrier Registers, total over 24 hours


                      Local:JD0138           Remote:JD0008
                      ------------           -------------
      Errored Seconds (ES)            0                    0
      Unavailable Seconds (UAS)       0                    0
      Severely Errored Seconds (SES)  0                    0
      Background Block Error (BBE)    0                    0


      Total Valid Intervals          11                   11




      -----------------------------------------------------------------
      0-SNMP Config.   1-Main Status    2-Data Status   3-Reports   4-Main Config.
      5-Data Config.   6-Timeslot Config.  7-Alarm I    8-Alarm II  9-Diagnostics
```

Figure 4-5   Menu-3 Perf. Reports, Carrier Reg., over 24 hours

Table 4-6   Carrier Registers, over 24 hours

| Parameter | Description |
|---|---|
| Errored Seconds (ES) | A second with one or more frame errors or CRC-4 errors. |
| Unavailable Seconds (UAS) | The number of seconds elapsed after 10 consecutive SES events are received. |
| Severely Errored Seconds (SES) | A second during which 300 or more CRC-4 violations or OOF events have occurred. |
| Background Block Error (BBE) | An errored block not occurring as part of an SES. |
| Total Valid Intervals | Total number of valid intervals in the last 24 hours. |

## Carrier Registers, 24-Hour Detail

The data is organized and displayed in 96 15-minute intervals. Performance data for the last 24 hours is displayed in the Carrier Registers, 24-hour detail menu as shown in the example in Figure 4-6.

```
SW Ver 2.1.c  MIB Ver 1.9    Digital Link SoloE1 Encore          5/18/98
HW Ver A                    Menu-3 Performance Reports            11:25:26
                       Carrier Registers, 24 hour detail
                         Local:JD0138                    Remote:JD0008
Local Interval          ------------                     -------------
Start       ES    UAS    SES     BBE          ES    UAS    SES     BBE
11:03:18     0     0      0       0            0     0      0       0
10:48:18     0     0      0       0            0     0      0       0
10:33:18     0     0      0       0            0     0      0       0
10:18:18     0     0      0       0            0     0      0       0
10:03:18     0     0      0       0            0     0      0       0
09:48:18     0     0      0       0            0     0      0       0
09:33:18     0     0      0       0            0     0      0       0
09:18:18     0     0      0       0            0     0      0       0
09:03:18     0     0      0       0            0     0      0       0
08:48:18   ---   ---    ---    ------        ---   ---    ---    ------
08:33:18   ---   ---    ---    ------        ---   ---    ---    ------
08:18:18   ---   ---    ---    ------        ---   ---    ---    ------
                             Page 1 of 8
--------------------------------------------------------------------------
0-SNMP Config.   1-Main Status     2-Data Status   3-Reports   4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Alarm I      8-Alarm II  9-Diagnostics

Up/Down Arrow Keys-scroll the registers
```

Figure 4-6    Menu-3, Carrier Registers, 24-Hour Detail

## User Registers, 24-Hour Detail

Performance data in the user registers for the last 24 hours is displayed in the User Registers, 24-hour detail menu as shown in the example in Figure 4-7.

```
SW Ver 2.1.c  MIB Ver 1.9    Digital Link SoloE1 Encore            5/18/98
HW Ver A                    Menu-3 Performance Reports              11:45:17
                         User Registers, 24 hour detail
              Local:JD0138                               Remote:JD0008
Interval      ------------                               ------------
Start      ES   US   CRC    CV              ES   US   CRC    CV
11:18:18    0    0    0      0               0    0    0      0
11:03:18    0    0    0      0               0    0    0      0
10:48:18    0    0    0      0               0    0    0      0
10:33:18    0    0    0      0               0    0    0      0
10:18:18    0    0    0      0               0    0    0      0
10:03:18    0    0    0      0               0    0    0      0
09:48:18    0    0    0      0               0    0    0      0
09:33:18    0    0    0      0               0    0    0      0
09:18:18    0    0    0      0               0    0    0      0
09:03:18    0    0    0      0               0    0    0      0
08:48:18  ---  ---  -----  -----           ---  ---  -----  -----
08:33:18  ---  ---  -----  -----           ---  ---  -----  -----
                            Page 1 of 8
-------------------------------------------------------------------------
0-SNMP Config.    1-Main Status      2-Data Status    3-Reports    4-Main Config.
5-Data Config.    6-Timeslot Config. 7-Alarm I        8-Alarm II   9-Diagnostics

Up/Down Arrow Keys-scroll the registers          C-clears the registers  _
```

Figure 4-7    Menu-3, User Registers, 24-Hour Detail

Only the User Registers performance report can be cleared (which resets the Error Free Seconds in Menu-1 Main Status to 100%.)

## Event Log

From the Event Log menu, you can display the events of the last 500 events (Figure 4-8):

1. **Use the arrow keys to select the event.**

2. **Press the Return key.**

The event log displays on the screen.

```
SW Ver 2.1.c  MIB Ver 1.9    Digital Link SoloE1 Encore           5/18/98
HW Ver A                  Menu-3 Performance Reports              12:03:40
                              Event Log

Log  Local     Module  All              Event  0. All Events

Seq. No.    Status  Module          Description             Time/Date
----------  ------  ------  ------------------------------  ----------------
        9   start   System  Remote Responds to DLC IBC      00:00:24  1/01/96
        8   end     Net     UA1 Received                    00:00:11  1/01/96
        7   start   Net     UA1 Received                    00:00:11  1/01/96
        6   end     Unit    Self Test                       00:00:11  1/01/96
        5   end     Net     Loss of Frame                   00:00:05  1/01/96
        4   start   Net     Loss of Frame                   00:00:05  1/01/96
        3   start   Unit    Self Test                       00:00:05  1/01/96
        2   start   DATA01  Loss of Signal                  00:00:03  1/01/96
        1   action  Unit    Unit Power On                   00:00:03  1/01/96


                   Page  1 of  1         9 out of   9 selected
--------------------------------------------------------------------------
0-SNMP Config.   1-Main Status     2-Data Status   3-Reports   4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Alarm I     8-Alarm II  9-Diagnostics

Up/Down Arrow Keys-scroll the log                   C-clears the log
```

Figure 4-8    Menu-3 Performance Reports—Event Log

Table 4-7 shows which status changes can be logged as events.

Table 4-7   Events

| Parameter (Default) | Events |
|---|---|
| Log (Local) | Local or Remote |
| Module (All) | Displays either Unit, DTE (Data01) (Full Bandwidth), Network, System or All |
| Unit | Unit Power On, Self Test, No Clock, Lamp Test, Smart Jack Reset, Smart Jack Set, Send UA1, Send RAI, Controlled Slip, Inject a Pattern Error, Clear Pattern Error Counter, Clear Event Log, Clear Current Carrier Registers, Clear Carrier Archives, Clear Carrier ESF Error Events, Clear Current User Registers, Clear User Archives, Clear User CRC Errors, Clear User CV Errors, Clear User FE Errors, Clear All user Error Counters, Clear 24 Hour User Registers, Back to Factory Config. Full test: Net Loopback Full or Fraction tests: DTE Loopback, PLD Loopback, LP UP Remote, LP DN Remote, Send User 1, Send User 2, Send 1:1, Send 1:2, Send 1:4, Send 1:7, Send 3:24, Send QRW, Send All 1s, Send All 0s |

Table 4-7   Events

| Parameter (Default) | Events |
|---|---|
| DTE | Loss of Signal, Local Test |
| Network | Loss of Signal, Loss of Frame, UA1 Received, RAI Received, Set Code Received, Reset Code Received, CV Threshold Exceeded, CRC Threshold Exceeded, FE Threshold Exceeded |
| System | External Alarm, Power Supply Failure, Controller Module Missing, Remote Responds to DLC IBC |
| Event (0, All) | Allows a particular type of event to be displayed |
| Seq. No | A string of 32-bit numbers from 1 to $2^{32}$-1 that uniquely identify a DSU/CSU. |

*4*

# *5*        *Diagnostics*

This chapter explains using diagnostics to locate and resolve problems with the Solo E1 DSU and/or equipment connected to the Solo E1 DSU.

Verify your connections and circuits to troubleshoot problems by running built-in diagnostic and pattern tests. These tests can isolate problems when they occur. In most cases, you won't need to use test equipment.

## Diagnostic Considerations

Running a test interrupts payload traffic. Run the tests at off-peak hours or during a designated maintenance window.

## Running A Diagnostic

To run a test with Menu-9 Diagnostics (Figure 5-1):

1. **Select the test in the** `Next Test`.

    These are Full Bandwidth loop code, Fractional loop code and USER1 Pattern and USER2 Pattern. The selections for fractions are Full (Bandwidth), and DATA01.

    The 20 test selections cycle with the up or down arrow key. For quick access to a specific test use the shortcut key (refer to Table 5-1).

2. **Set the** `Next Test Length: unlimited, 60 min, 15 min, 1 min.`

3. **Press** `s` **to start the test.**

4. **Press** `y` **to confirm.**

    Press any other key to cancel your action.

    The test results are shown in the upper half of the screen.

5. **To end the test, press** `e`**, then** `y` **to confirm**

    Or any other key to leave the test running.

6. **To clear the pattern error counter, press** `c` **, then** `y` **to confirm.**

    Or any other key to cancel.

```
SW Ver 2.1.c  MIB Ver 1.9    Digital Link SoloE1 Encore           5/18/98
HW Ver A                       Menu-9 Diagnostics                 11:47:17
                                 Local:JD0138                 Remote:JD0008
                                 ------------                 -------------
Current Test                              Idle                         Idle

Pattern Test Status                       Idle                         Idle
Pattern Error Counter
CRC4 Errors                                  0                            0
Code Violations                              0                            0
Frame Error Events                           0                            0
Last Self Test Result         Self Test Passed             Self Test Passed

Next Test (Fraction)            1. Self Test                 1. Self Test
Next Test Length                   Unlimited                    Unlimited
Full Bandwidth Loop Code            Standard                     Standard
Fractional Loop Code                Standard                     Standard
USER1 Pattern         0011001100110011001100110011   0011001100110011001100110011
USER2 Pattern         0001000100010001000100010001   0001000100010001000100010001
                      ----------------------------------------------------------
0-SNMP Config.    1-Main Status      2-Data Status    3-Reports    4-Main Config.
5-Data Config.    6-Timeslot Config. 7-Alarm I        8-Alarm II   9-Diagnostics
S-starts a test   CR-changes a value          I-injects a pattern error
E-ends a test     Arrow keys-move selection   C-clears pattern error counter
```

Figure 5-1    Menu-9 Diagnostics

Table 5-1, Table 5-2, and Table 5-3 describe the Menu-9 Diagnostics parameters of Figure 5-1.

## *Shortcut*

When you are in Menu-9, `Next Test (Fraction)` is automatically highlighted.

1. **Press Enter.**

   `Use the UP or DOWN arrow keys or type a test index to select a new test:`

2. **There are 20 tests, if you know the number, type it in, otherwise  toggle through the menu choices.**

   If the number is a single digit, you must type a **0** in the first space.

   The number you type is not visible.

3. **Press Enter.**

   `Do you really want to change the Configuration [Y/N]?`

**4. Type  y for yes and the test will begin.**

The tests available in the Next Test parameter are shown in Table 5-2.

Table 5-1   Meru-9 Diagnostic Parameters

| Parameter | Value | Description |
|---|---|---|
| Pattern Test Status | Idle<br>Searching<br>Locked<br>Relocked | Locked Seconds is displayed if the current pattern test is locked. The Locked Seconds is a 16-bit counter which is reset to 0 if the current pattern is unlocked. The counter label will change to Relocked Seconds if the current pattern is unlocked and then relocked. |
| Pattern Error Counter | Error count | Shows number of errors encountered. |
| CRC4 Errors | Error count | Shows number of errors encountered. If CRC4 is not enabled, this function is not available. |
| Code Violations | Error count | Shows number of errors encountered. |
| Frame Error Events | Error count | Shows number of errors encountered. |
| Last Self Test Result | Self Test Passed<br>Failure indication: 0-5 | Error nn (0 to 5). See Table 5-4 on page 5-5 for discussion of error codes. |

Table 5-2   Next Test Diagnostics

| Shortcut | Test | Options |
|---|---|---|
| 1 | Self Test | See "Self Test" on page 5-4 |
| 2 | DTE Lpbk | FULL, DATA01 |
| 3 | NET Lpbk | FULL, DATA01 |
| 4 | PLD Lpbk | FULL, DATA01 |
| 5 | LP UP Remote | FULL, DATA01 |
| 6 | LP DN Remote | FULL, DATA01 |
| 7 | Send QRW | FULL, DATA01 |
| 8 | Send 1:7 | FULL, DATA01 |
| 9 | Send 3:24 | FULL, DATA01 |
| 10 | Send 1:1 | FULL, DATA01 |
| 11 | Send All 1s | FULL, DATA01 |
| 12 | Send All 0s | FULL, DATA01 |
| 13 | Send 1:2 | FULL, DATA01 |
| 14 | Send 1:4 | FULL, DATA01 |
| 15 | Send User 1 | FULL, DATA01 |

Table 5-2   Next Test Diagnostics  (Continued)

| Shortcut | Test | Options |
|----------|------|---------|
| 16 | Send User 2 | FULL, DATA01 |
| 17 | Smart Jack Set | FULL, DATA01 |
| 18 | Smart Jack Reset | FULL, DATA01 |
| 19 | Lamp Test | Tests all LEDs display operation |
| 20 | Loop DTE/NET | See Table 5-3 |

Table 5-3   Next Test Diagnostics Parameters

| Parameter | Value | Description |
|-----------|-------|-------------|
| Next Test Length | 15 min<br>1 min<br>60 min<br>Unlimited | Does not apply with the Self Test, loopup remote and loopdown remote. |
| Full Bandwidth Loop Code | Standard<br>Alternate<br>Disabled | Standard—sends a series of 0s and 1s. Alternate—sends the opposite of the Standard (1s and 0s). |
| Fractional Loop Code | Standard<br>Alternate<br>Disabled<br>V.54 | Standard—sends a series of 0s and 1s. Alternate—sends the opposite of the Standard (1s and 0s). |
| USER 1 Pattern<br>USER 2 Pattern | User defined | Enter a sequence of 1s and 0s, between 1 and 24 characters in length. |

## Self Test

The Self Test checks the DSU/CSU electronic components and performs a signal path check of transmit and receive directions utilizing a simulated 1219.2 meter (4000 ft) E1 line.

Possible messages are RUNNING SELF TEST, SELF TEST PASSED or ERROR <N>, where <N> is one of the error codes shown in Table 5-4.

Table 5-4   Self Test Error Indicators

| Error Code | Description |
|---|---|
| 0 | ROM Checksum test failed |
| 1 | RAM test failed |
| 2 | EEPROM Checksum test failed |
| 3 | DTE test failed |
| 4 | Pattern test failed |
| 5 | Flash Proms Checksum test failed |

# ☰ 5

## The Loop DTE Test

The Loop DTE test verifies the operation of the DSU/CSU and the associated DTE cabling and equipment by looping the E1 network transmit signal through a 4 000 foot simulated line to the DSU/CSU network receive circuitry (Figure 5-2 shows both Full and Fractional Bandwidth).

The DTE equipment should receive the same signal (a series of 1s and 0s) it transmitted. The E1 network transmitter continues to transmit the pattern toward the network while the DSU/CSU is in DTE loopback.

E1 payload transmission is interrupted during this test.
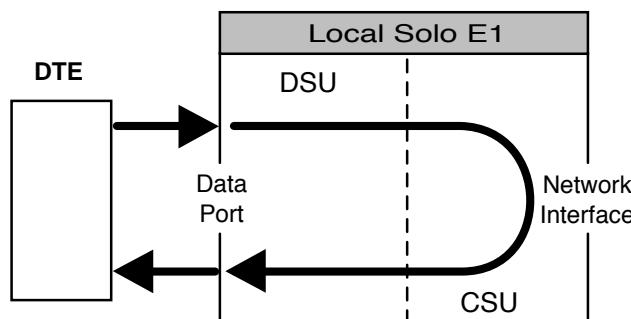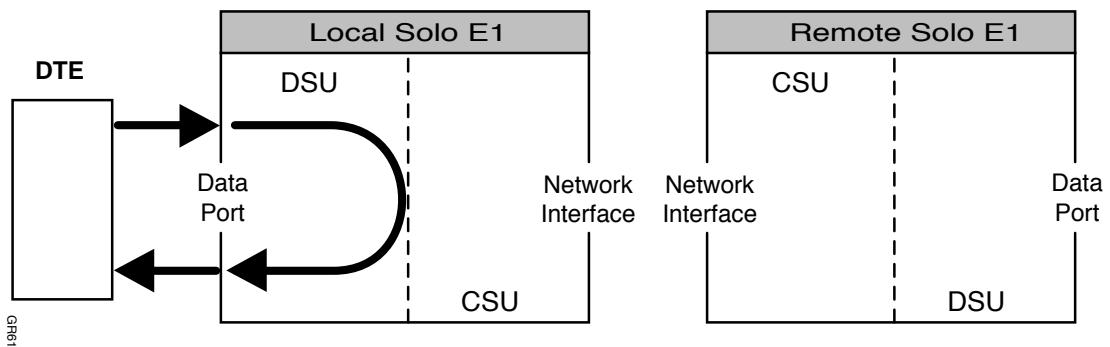


Figure 5-2    Loop DTE Test—Full and Fractional Bandwidth

### Alternate Option

The signal sent is exactly opposite the signal sent in standard mode. This is useful for testing a remote unit that has other equipment in between the local and remote. The other equipment does not recognize the signal and passes it through to the remote.

**NOTE:** The DTE device must be able to recognize its own test pattern for Loop DTE to verify the DTE cabling and equipment. Without this capability, the Loop DTE test can only verify the DSU/CSU.

## The Loop NET Test

The Loop NET test, available only on full bandwidth, verifies the operation of the E1 network. (Figure 5-3).

It loops the data received from the E1 network back to the network. The data is regenerated before it is looped back, however, the DSU/CSU does not perform additional processing of the data.

This minimizes the impact of the DSU/CSU during the test so that network problems can be isolated.
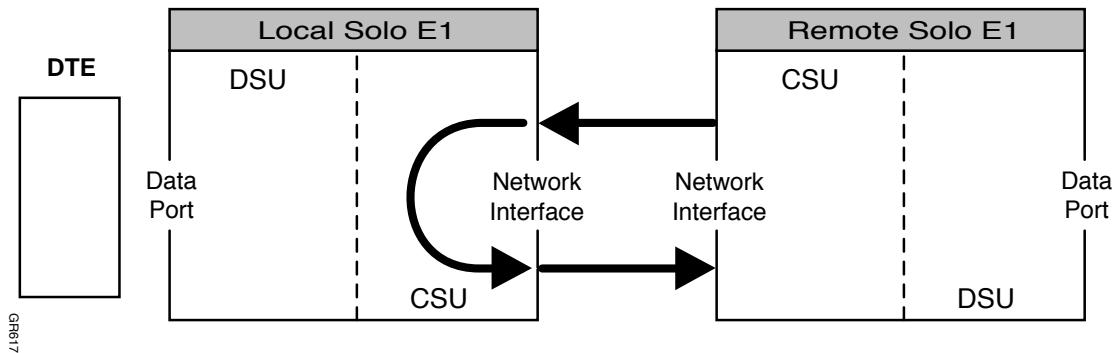


Figure 5-3    Loop NET Test

## The Loop Payload Test

The loop payload test verifies proper operation of the DSU/CSU and the E1 network (Figure 5-4).

It loops the payload data received from the E1 network back toward the network. Before it is looped back, the data is regenerated and a new framing pattern is inserted. Thus, the proper E1 framing of the DSU/CSU and network can be verified.
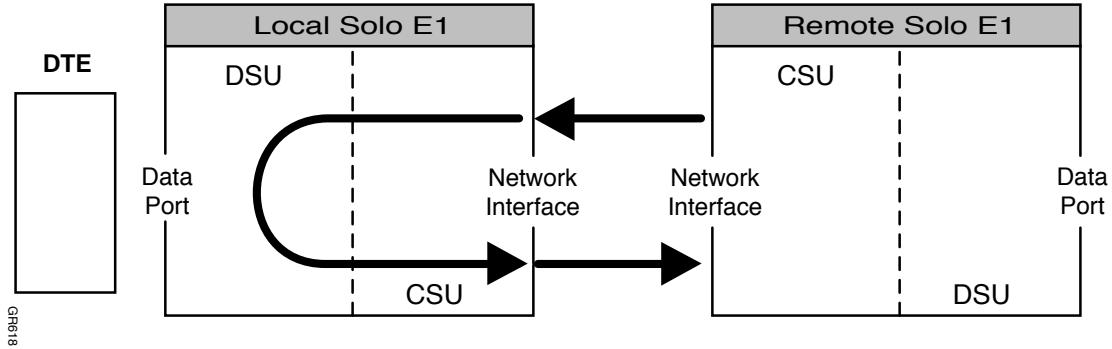


Figure 5-4    Loop Payload Test

The individual channel loop payload loops a selected "fraction" of the E1 signal toward the network. In this mode, the selected data is corrected for BPV, CRC and framing errors, and the IBC is regenerated before the data is looped back to the network.

Receive and transmit clocks and data are suppressed toward the V.35 port on the DTE channels.

### The DTE/NET Test

The loop DTE/NET test combines the loop DTE on full bandwidth, and the loop NET tests.

## Running Multiple Payload Tests

To run multiple loopbacks, the device must have more than two DTE ports. You can run multiple loop payload tests simultaneously from Menu-9 or SNMP, but not from the front panel interface.

You can run multiple fractional loop payload tests by sending fractional loop codes from the remote DSU/CSU via SNMP, DLMS, a terminal, or from the front panel interface.

> **NOTE:** To run multiple fractional loop payload tests, you must first terminate any current tests (other than a fractional payload test).

## The Loopup/Down Remote Tests

The loopup remote test puts the remote DSU/CSU into network loopback. Once in loopup remote, test patterns can be sent to verify the Bit Error Rate (BER) performance of the bidirectional E1 network signal (Figure 5-5).

To put the remote DSU/CSU into network loopback, the local DSU/CSU momentarily transmits the loopup code to the remote DSU/CSU. If the remote DSU/CSU does not go into network loopback within 15 seconds, a failure is declared and the DSU/CSU stops sending the loopup code.

The loop code and network parameters for the local and remote DSU/CSUs must match. Use the loopdown remote test to terminate the remote loopback.

> **NOTE:** The full bandwidth loopup code puts the remote DSU/CSU in a full bandwidth network loopback. The fractional loopup code puts the DSU/CSU in a fractional (per individual port) payload loopback.

To run this test from the front panel, refer to "Loopup Remote and Loopdown Remote" on page 5-13.
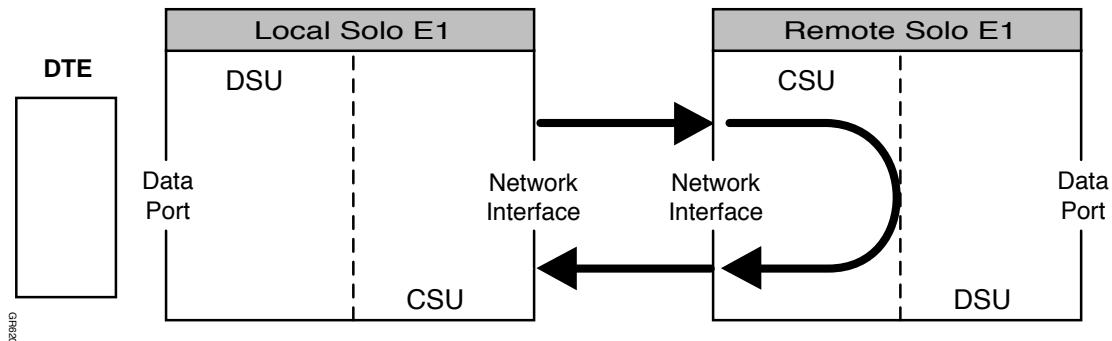
Figure 5-5    Loopup Remote Test

## Pattern Tests

Table 5-2 contains a list of these pattern tests.

### The QRW Test

QRW (Quasi Random Word) is a pseudo random signal which catches problems not exposed by other test patterns. The DSU/CSU transmits a QRW pattern to the E1 network, the remote system loops it back to the DSU/CSU which monitors the signal for QRW bit errors.

You can also use the QRW code to isolate a E1 network problem to a specific transmission direction. In this case, both E1 transmission directions are monitored when the local and the remote system transmit QRW (the remote is not put into loopback).

This test is available on any fraction of the E1.

To simulate live traffic, QRW testing is strongly recommended.

### The Send 1:7 Test

This pattern stresses the timing recovery circuits of repeaters and other intermediate equipment.

### The Send 3:24 Test

This pattern tests for 1s density (consecutive zeros) tolerance on AMI lines.

### The Send 1:1 Test

This pattern sends alternate 1s and 0s to test for bridge taps.

### The Send All Ones Test

This pattern is used for signal power measurements. All 1s simulates the highest spectral components and the highest energy out of the DSU/CSU and out of the line repeaters on the E1 line.

### The Send All Zeros Test

This pattern checks the correct operation of the HDB3 (E1) line coding.

## The Send 1:4 (or alternate) Test

Use when the loopup remote test fails to put the remote system into loopback. You can determine if the failure is an intermittent or a hard failure by continuously sending the 1:4 code, and monitoring the network status to see if the pattern is being received.

The selections are available on the full bandwidth and on the **DATA** ports.

The full bandwidth code puts the remote system into full network loopback. When used on a **DATA** port, the code puts the corresponding remote port into loop payload.

> **NOTE:** If the loopup remote test fails to place the remote system into loopback, check that the loop code and Network Framing parameters are the same at each end of the link.

## The Send 1:2 Test

Use the 1:2 loopdown code when the loopdown remote test fails to terminate the remote loopback.

You can determine if the failure is an intermittent or hard failure by continuously sending the 1:2 and monitoring the network status to see if the pattern is being received.

The selections are available on the full bandwidth and on **DATA** port 1. The full bandwidth code takes the remote system out of full network loopback. When used on **DATA** port 1, the code takes the corresponding remote port out of loop payload.

## The User 1 Pattern and User 2 Pattern Tests

These two user programmable (up to 24 bits) patterns enable you to generate a test pattern rather than use pre-programmed patterns or live traffic.

## The Lamp Test

Use this test to verify the LEDs. During the test, all LEDs on the front panel illuminate.

## Status LEDs

Use the LEDs to verify the test progress (Table 5-5).

Table 5-5   Front Panel LEDs Status

| LED | Condition | Description |
| --- | --- | --- |
| PWR/TEST | Turns yellow | Test is running. The test is identified in current test. |
| PWR/TEST | Blinks | Self-test in progress. |
| ACK | Blinks quickly for 3 seconds | Loopup remote or loopdown remote is successful. |

## Running Tests From Front Panel

From the front panel you can run the (Figure 5-6):

- DTE/NET loopback test
- Loopup remote test and loopdown remote test

To start a test, press a front panel button for no less than 0.5 seconds.



Figure 5-6     Solo E1 DSU Standalone Front Panel

The PWR/TEST LED shows test status (Table 5-6).

Table 5-6   PWR/TEST LED Status Indicators

| Condition | Description |
| --- | --- |
| Blinks yellow | A test is running |
| Turns green | A test is complete |
| Turns red for 10 seconds, then turns green | Test failed |

## DTE/NET Loopback

To start this test:

**1. Press DTE/LPBK to start the DTE/NET loopback test.**

**2. Press DTE/LPBK again to end the test.**

## Loopup Remote and Loopdown Remote

To start this test:

**1. To run the test, press REMOTE LPBK UP to loopup the remote Solo E1 DSU.**

**2. To loopdown the remote Solo E1 DSU, press REMOTE LPBK DOWN.**

When a test is running, the PWR/TEST LED shows yellow.

# The Pattern Tests

Thoroughly test a line between two Solo E1 DSUs or between the customer premises and the service provider with a pattern test:

• Use a pattern test in conjunction with a loop test by placing one Solo E1 DSU in loopback mode toward the network while the other generates and detects the test sample.

The Solo E1 DSU generating the pattern detects and counts errors in the pattern received and displays the errors.

• Run a pattern test by configuring both Solo E1 DSUs to perform the same pattern test at the same time.

Both Solo E1 DSUs report detected errors in their respective received signals, and you can determine from which direction (and which Solo E1 DSU) the errors are occurring.

The tests also look for bit errors in both circuit directions when the remote unit is looped up. In this case, the Solo E1 CSU transmits the QRW to the E1 network, the remote unit loops it back to the Solo E1 CSU which monitors the signal for errors. You can also use the QRW code to isolate a E1 network problem to a specific transmission direction. In this case, both E1 transmission directions are monitored when the local and the remote units transmit QRW (the remote is not put into loopback).

The pattern tests are listed in Table 5-7.

Table 5-7   Pattern Tests

| Pattern Test | Description |
|---|---|
| Send All Ones | Use this test to expand circuit as a maximum density signal, it is also used to test synchronization circuits. |
| Send All Zeroes | Use to test the zero suppression circuit. As a minimum density signal, it is also used to test synchronization circuits. |
| Send 1:1 | This pattern sends alternate ones and zeros. It is used in testing for bridge taps. |
| Send 1:2 Pattern | The 1:2 code is the standard loopdown remote code. Use it when the loopdown remote test fails to terminate the remote loopback. You can determine if the failure is an intermittent or hard failure by continuously sending the 1:2 and monitoring the network status to see if the pattern is being received. |
| Send 1:4 Pattern | The 1:4 code is the standard loopup remote code. It is typically used when the loopup remote test fails to put the remote unit into loopback. You can determine if the failure is an intermittent or a hard failure by continuously sending the 1:4 code and monitoring the network status to see if the pattern is being received. |
| Send 1:7 Pattern | This pattern stresses the timing recovery circuits of repeaters and other intermediate equipment. |
| Send 3:24 Pattern | This pattern tests for ones density (consecutive zeros) tolerance on AMI lines. |
| User 1/User 2 Patterns | These two user programmable patterns (up to 24 characters) enable you to generate a test pattern rather than use pre-programmed patterns or live traffic. |
| QRW Pattern | The Quasi-Random Word (QRW) test measures Bit Error Rates on the E1 network. The Solo E1 CSU sends a QRW into the network and monitors the received E1 network signal for QRW bit errors. |

# *6* Troubleshooting

This chapter describes problems you may encounter and possible solutions (see ). If these solutions do not correct the problem, contact Digital Link Technical Support for assistance.

| | |
|---|---|
| **Telephone** | **(408) 745-4200** |
| **FAX** | **(408) 745-4240** |
| **Email** | **support@dl.com** |
| **Internet** | **www.dl.com** |
| **24-Hour Service, 7 Days a Week** | |

Table 6-1    Problem List

| Problems |
| --- |
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### The Solo E1 DSU Does Not Power Up

If the unit is AC powered, make sure the Solo E1 DSU is plugged into a live AC outlet. If the unit is DC powered, make sure the respective DC leads are not crossed.

Check all fuses for opens and replace as needed.

### The Solo E1 DSU Does Not Dial Out When An Alarm Occurs

Make sure the connection between the **COMM** Port and the modem is a crossover (null) modem connection.

A DCE port is represented the same way as the modem port.

Make sure Connection is set to Modem and two valid telephone numbers are set in Phone Number 1 and Phone Number 2 in Menu 8 Alarm II.

Make sure Block all Alarms is set to No in Menu-7 Alarm and the occurring alarm is set to Enabled.

### *Current Tests Terminate Without My Intervention*

Make sure the Solo E1 DSU is set to run the test for an unlimited amount of time.

Test length options are 15 min, 1 min, 60 min, Unlimited.

### *The Solo E1 DSU can not Enter Network Loopback from the Carrier*

Verify:

- The network carrier is sending a network loopup code.
- The Solo E1 DSU is set to receive loopup codes, not alternate loopup codes.
- The Solo E1 DSU is set to receive the same or alternate code as the network.

Using your E1 test set, send a loopup code into the Solo E1 DSU.

### *The Unit Suffers Loss Of Signal or Loss Of Frame on the Network Port*

An RAI is sent in the direction of the network port.

In the alarm menu, the Network status reports "Loss of Signal" or "Loss of Frame" and CTS is de-asserted.

### *Unframed All 1s Are Received On The Network Port*

In the alarm menu, set the Network status to "RAI Received."

The RLSD line on the **DATA** port is de-asserted.

Typically represents an E1 service alarm.

### *The Solo E1 DSU can not enter into Payload Loopback from the Network*

Make sure the Solo E1 DSU is set for V.54 fractional loopback code, if the network is sending V.54 to loop it up.

Make sure the payload portion you are attempting to loopup has assigned bandwidth.

If the Solo E1 DSU still does not loopup, use your E1 test set to inject a fractional loopback signal into the payload you wish to loopup.

### The NET LED does not Illuminate

Run a lamp test from Menu-9 Diagnostics to make sure the LEDs are working.

Make sure the E1 line from your service provider is connected to the DA-15 female connector on the back of the Solo E1 DSU.

Remove the E1 line from the back of the Solo E1 DSU and place the E1 test set in its place. Connect the transmit of the E1 test set to the receive of the network plug (pins 3 and 11, 3—tip, 11—ring). If the **NET** LED changes to any color, i.e., green or red, contact your service provider for assistance with cutting over the E1 line.

If the **NET** LED does not light, place the E1 loopback plug on the network connector on the back of the Solo E1 DSU. If it then changes color, troubleshoot your test setup. If no test plug is available, loopback pins 1 and 3, and pins 9 and 11. The **NET** LED should light green.

### The NET LED is Constantly Red

Make sure the E1 line framing format matches the Solo E1 DSU framing format.

Check the Solo E1 DSU for excessive errors.

In CRC4 mode, check for CRC and CVs; in unstructured mode, check for CVs only. If excessive errors appear, place your E1 test set or your loopback plug on the DA-15 female connector on the back of the Solo E1 DSU to see if the errors stop.

If they do, contact your service provider for assistance.

### The NET LED Remains a Constant Yellow

Check to see if the Solo E1 DSU is receiving a RAI alarm or an UA1 alarm.

Make sure the remote/far end Solo E1 DSU is receiving a proper E1 signal. If it is not, it will be generating an RAI alarm towards your equipment.

If the Solo E1 DSU is still receiving an RAI alarm, place the E1 test set or the E1 loopback plug on the DA-15 female connector on the back of the Solo E1 DSU. If the RAI alarm stops, contact your service provider for assistance.

If, after all above steps have been satisfied, your Solo E1 DSU still shows a yellow **NET** LED, call Digital Link Technical Support for assistance.

If the yellow alarm is disabled, this condition is ignored. In the alarm menu, indicate "RAI" for Network status. The CTS line on Data DTE is de-asserted.

### The NET LED Flickers Intermittently between Red, Yellow and Green

Make sure the timing source is properly configured. Timing should be set to NETWORK if the network is the source.

If it is not the source, timing should be set to INTERNAL at one E1 end, and NETWORK at the other end.

If you're not sure that the network is the source, contact the network provider and discuss your circuit order. The provider will tell you if the E1 network is the source.

If the timing source is properly configured and the **NET** LED continues to flicker between red, yellow, and green, isolate the Solo E1 DSU with the E1 test set to see if the problem clears.

Place the E1 test set into the proper timing mode (provide timing or recover timing). You cannot use the loopback plug in this application since it would require us to provide timing and would not allow us to see if we can recover timing from a valid E1 source.

If the **NET** LED continues to flicker, call Digital Link Technical Support for assistance.

### The Data Port TD/RD LEDs do not Illuminate

Make sure the DTE cable is plugged into the appropriate connector on the back of the unit. The connectors are labeled port one, port two, etc., depending on your Solo E1 DSU type.

Check the timeslot allocation to make sure bandwidth is allocated to the specific **DATA** port.

Run a lamp test from Menu-9 Diagnostics to make sure the LEDs are working.

Make sure the DTE devices connected physically to the units are sending data to each other. The serial line will not transmit data or receive data if it is shut down.

Using the terminal interface, set DATA Port Status = "Loss of Signal."

If you have eliminated the above as a cause, place your data test set on the problem port.

### The DATA Port RTS/CTS LEDs do not Illuminate

If the DTE device does not support the RTS or DTR signalling, set the port DTE loss to None (default—RTS) in the Data DTE Configuration menu.

The CTS LED should light and remain lit.

RTS and DTR are signals sent from the DTE device connected to the Data Port.

Run a lamp test from Menu-9 Diagnostics to make sure the LEDs are working.

### The DTE Device Shows Intermittent Errors

You may have a timing error, check network statistics.

If you are timing the Solo E1 DSU from the DTE device, set the data port as the source of the timing signal. You need a special DTE cable to enable you to configure the Solo E1 DSU as a DTE device. The cable you use depends on your application.

If the cable and the timing are correct, place a data test set at both ends of the E1 line in place of the DTE devices to see if the errors continue.

### No LEDs Illuminate

Test the LEDs by running a lamp test from Menu-9 Diagnostics.

### After Powerup, the Clock Does Not Show the Correct Time or Date

Each time you power up, the time and date reset to a default value. You must enter the correct time and date in the time and date fields in Menu-4 Main Configuration.

# *Technical Specifications*   **A**

This appendix lists information on both the module and standalone products.

Table A-1   Network Interface

| Item | Rating |
|------|--------|
| Transmit bit rate | 2.048 Mbps ± 50 ppm |
| Receive bit rate | 2.048 Mbps ± 75 ppm |
| Line code | HDB3 |
| Framing | ITU-TS G.704/CTR 12 |
| Pulse shape | ITU-TS G.703/CTR 12 |
| Jitter | ITU-TS G.823/CTR 12 |
| Output level | ITU-TS G.703/CTR 12 |
| Input level | 0 to -26 dB |
| Impedance | 75 ohm (BNC) unbalanced or 120 ohm (DA-15) balanced |

Table A-2   Data Interface

| Item | Specification |
|------|---------------|
| Interface types | V.35, X.21 or RS-449/EIA-530 |
| Data rates | Nx64 kbps (N=1 through 31) |
| Line code | Normal only |
| Clocking options | SCTE, SCT, inverted SCT |
| System timing | Internal, Network, DATA Port, External |
| Mode | DTE or DCE |

Table A-3   Power

| Item | Specification |
| --- | --- |
| AC Power | 100-240 VAC, 50-60 Hz/0.5 A |
| DC Power | -48 VDC to -72 VDC, 0.5 A |
| Power Consumption | 6 W maximum |
| AC Power Connection | AC power cord attached to AC receptacle |
| DC Power Connection | Through two-position Phoenix connector |
| Fuse | External AC fuse or internal DC fuse. |

Table A-4   Environmental

| Item | Specification |
| --- | --- |
| Operating Temperature | 0° to 50°C ambient |
| Storage Temperature | -20° to +60°C |
| Relative Humidity | 0 to 95% noncondensing |
| Altitude | 4.6 km (15,000 ft) |

Table A-5   Reliability and Equipment Life

| Product | Item | Specification |
| --- | --- | --- |
| Stand-alone | MTBF | 12 years minimum |
| | MTTR | 30 minutes maximum |
| Module | MTBF | 16 years minimum |
| | MTTR | 30 minutes maximum |

## Regulatory

Applicable European harmonized standards:

- 89/336/EEC
- 92/31/EEC
- 93/68/EEC
- 73/23/EEC

- 98/13/EC

To maintain EMC Class B (CE Label) compliance, shielded cables should be used with the unit.

Table A-6   Mechanical Specifications

| Stand-Alone |
| --- |
| Dimensions—21.8 cm W x 4.3 cm H x 30.5 cm D (8.6 in W x 1.7 in H x 12 in D) |
| Mounting—Desktop or tray mounted on a19-inch or 23-inch rack |
| Weight—2.54 kg (5.6 lb) |
| **Module** |
| Dimensions—1.9 cm W x 20.9 cm H x 22.2 cm D (0.75 in W x 8.25 in H x 8.75 in D) |

Table A-7   Network Management Interface

| Item | Description |
| --- | --- |
| User Interface | Menu driven |
| Electrical | RS-232 |
| Mechanical | DE-9 D-subminiature |
| **COMM** Port | DCE |
| Interface Device | Serial ASCII terminal, SNMP workstation or Hayes-compatible modem |

Table A-8   Timing Requirements

| Item | Specification |
| --- | --- |
| Loop | Preferred timing source unless a private line is used. |
| Network | If the unit is set for loop timing and the network received signal is lost, timing automatically reverts to Internal. |
| Internal | If using private line applications, set one DSU/CSU to Internal. |
| DATA01 | Nx64 kHz or 2048 kHz |

# *A*

## Diagnostics

The unit is designed to facilitate the maintenance of the line and troubleshooting of problems by incorporating comprehensive diagnostics tools into the unit. In most cases, these tools will eliminate the need for test equipment when diagnosing network problems.

Table A-9   Diagnostics and Tests

| Item | Diagnostics And Tests |
|---|---|
| Loopbacks | E1 Network, E1 payload, DTE, Fractional E1 payload, Fractional DTE |
| E1 Loopback Control | E1 Set/Reset Code, In-Board Commands, Front Panel, **COMM** Port |
| **Fractional Payload** | |
| Loopback Control | CCITT V.54 Sequence, **COMM** Port |
| Test Patterns | QRW, 1-in-1, 1-in-7, 3-in-24, All 1s, All 0s, Smart jack, 2-User Programmable 24 Bit Patterns |
| **Alarm Parameters** | |
| E1 Network Port | NET Carrier Loss Alarm |
| | NET Sync Loss Alarm |
| | NET UAI Alarm |
| | NET RAI Alarm |
| | CRC, CV, RE Threshold Alarm |
| DATA Ports | RTS Loss Alarm |

## Telnet and SNMP Management

The Solo E1 DSU supports the industry-standard Telnet and Simple Network Management Protocol (SNMP) Management Information Base (MIB II). Full embedded SNMP agent through SNMPv1, supporting RFC 1213, RFC 1406, MIB II, with enterprise MIB.

Telnet through the **COMM** port operates at one of the following baud rates: 1200, 2400, 4800, 9600, 14400, 19200, 28800, and 38400.

# Related Model Numbers

Table A-10 lists the model numbers of related Digital Link products.

Table A-10 Digital Link Equipment Model Numbers

| Model Number | Description |
|---|---|
| **Standalone Units** | |
| DL085E-075b | Solo E1 DSU, 75 ohm BNC connector |
| DL085E-120d | Solo E1 DSU, 120 ohm DA-15 connector |
| DL085E-M | Solo E1 DSU User Guide |
| **Shelf System** | |
| DL2000E | Shelf, SNMP managed, BNC and DA-15 connectivity |
| DL2110 | AC Power Supply Module |
| DL2130 | Ensemble WAN Control Module A |
| DL2131 | Management Access Processor Module |
| DL2020E-075b | Solo E1 DSU Module, 75 ohm, BNC' |
| DL2020E-120d | Solo E1 DSU Module, 120 ohm, DA-15 |
| DL2160 | Blank DSU/CSU Faceplate |
| DL2161 | Blank Power Supply Faceplate |
| DL2020E-120na | Solo E1 DSU Module, 120 ohm, DA-15 for DL2001 shelf |
| **DTE Cables** | **Cable to customer equipment** |
| DL1300-10 | V.35, DB-25 plug to M34 plug, 3.04 m (10 ft) |
| DL1301-01 | V.35, DB-25 plug to M34 socket, 30 cm (1 ft) |
| DL1301-10 | V.35, DB-25 plug to M34 socket, 3.04 m (10 ft) |
| DL1303-10 | RS-449, DB-25 plug to DC-37 socket, 3.04 m (10 ft) |
| DL1308-10 | EIA 530, DB-25 plug to DB-25 plug, 3.04 m (10 ft) |
| DL1310-10 | X.21, DA-15 plug to DB-25 plug, 3.04 m (10 ft) |
| DL1311-10 | X.21, DA-15 socket to DA25 plug, 3.04 m (10 ft) |
| **Network Cables** | **Cable to E1 network** |
| DL1007 | DA-15 plug to DA-15 plug, 2.13 m (7 ft) |
| DL1016 | DA-15 socket to DA-15 plug, 2.13 m (7 ft) |
| DL1405-10 | 75W coaxial network cable, 3.04 m (10 ft) |

Table A-10 Digital Link Equipment Model Numbers  (Continued)

| Model Number | Description |
| --- | --- |
| DL1081 | DE-9 to DE-9, 2 connections |
| **Communications Cables** | **Cable to terminal** |
| DL1082 | DE-9 to DE-9, 4 connections |
| DL1083 | DE-9 to DE-9, 8 connections |

# ≡ B | *Connector and Pin Assignments*

Table B-1 lists the pin assignments for the DA15 network interface connector.

Table B-1   Network Interface Pin Assignments

| Pin | Signal |
|---|---|
| 1 | Send toward Network Tip (T1) |
| 9 | Send toward Network Ring (R1) |
| 2 | Frame Ground |
| 3 | Receive from Network Tip (T) |
| 11 | Receive from Network Ring (R) |
| 4 | Frame Ground |
| 5, 6, 7, 8, 10, 12,13,14,15 | N/C |

Table B-2 describes **DATA** port signals from the Solo E1 DSU to the equipment.

Table B-2   DATA Port Signals—Solo E1 DSU to Equipment

| Name | V.35 | EIA-530 | X.21 | RS-449 | Description |
|---|---|---|---|---|---|
| Serial Clock Transmit | SCT-A, B (Y,AA) | SCT-A, B (15, 12) | | SCT -A, B (15,23) | Clock for SD. SD changes on positive transition of SCT (A) - SCT(B) |
| Serial Clock Receive | SCR-A SCR-B (V, X) | SCR-A SCR-B (17,9) | Signal Element Timing (6,13) | RT -A, B (8,26) | Clock for RD. RD changes on positive transition of SCT (A) - SCT(B) |
| Receive Data | RD-A RD-B (R,T) | RD-A RD-B (3,16) | Receive (4,11) | RD -A, B (6,24) | Received data from the DCE |
| Data Set Ready or Data Mode | DSR (E) | DCE RDY-A, B (6,22) | | DM-A, B (11,29) | Described in Table B-4 |
| Receive Line Signal Detect | RLSD (F) | RLSD-A, B (8, 10) | Indication (5,12) | RR-A, B (13,31) | Described in Table B-4 |

Table B-2   DATA Port Signals—Solo E1 DSU to Equipment

| Name | V.35 | EIA-530 | X.21 | RS-449 | Description |
|------|------|---------|------|--------|-------------|
| Clear To Send | CTS (D) | CTS-A, B (5,13) | | CS-A, B (9,27) | Described in Table B-4 |
| Ring Indicator | RI (J) | | | | Always inactive |
| Test Mode | | TM (25) | | TM (18) | Described in Table B-4 |

Table B-3 describes **DATA** port signal from the equipment to the DSU.

Table B-3   DATA Port Signals—Equipment to Solo E1 DSU

| Name | V.35 | EIA-530 | X.21 | RS-449 | Description |
|------|------|---------|------|--------|-------------|
| Send Data | SD A, B (P, S) | TD-A, B (2, 14) | Transmit (2, 9) | SD A, B (4,22) | Data stream from DTE. |
| Data Terminal Ready | DTR (H) | DTE READY (20,23) | | RT A, B (12,30) | Can be used to indicate loss of DTE signal. The **DATA** port can be programmed to recognize Loss of DTE as either loss of RTS signal, loss of DTR signal or neither (the condition is never recognized). The hardware also supports the detection of all zero condition from the DTE which could be used to indicate a loss of DTE but currently not supported. |
| Request To Send | RTS (C) | RTS (4, 19) | Request To Send (3,10) | RS A, B (7,25) | Affects assertion of CTS and sending of Blue Alarm only if loss is set to RTS. |
| Local Test/Local Loop | LT (K) | LL (18) | | LL (10) | When line is asserted by DTE, unit enters fractional DTE Loopback test and remains in test for as long as signal is held active. |
| Send Clk Transmit Echo | SCTE A, B (U,W) | TT-A, B (24,11) | | TT A, B (17,35) | SCTE can be either a timing source to clock in the SD signal or an external timing source for use as a network transmit timing reference |
| **Ground** | | | | | |

Table B-3    DATA Port Signals—Equipment to Solo E1 DSU

| Name | V.35 | EIA-530 | X.21 | RS-449 | Description |
|------|------|---------|------|--------|-------------|
| Signal Ground | SG(B) | SG(7) | | SG(19) | |
| Frame Ground | A | 1[1] | | | DTE side connection only. |

1.  ONE = OFF = MARK =V(A) < V(B) or V(A) < 0, and ZERO = ON = SPACE = V(A) > V(B) or V (A) > 0

Table B-4 describes **DATA** port signals.

Table B-4    DATA Port Signal Overview

| Item | Specification |
|------|---------------|
| DSR/DM Line | The DSR line is dropped when a test is performed to prevent use of the unit for payload traffic. The **DATA** Port is asserted unless one of following is true:<br><br>• DSU or CSU Loopback<br><br>• Loop Up Remote Test<br><br>• Loop Down Remote Test<br><br>• Self Test in progress<br><br>• DSU performing pattern test |
| TM Line | The TM line to the **DATA** Port is asserted if one of following tests is running:<br><br>• DSU or CSU Loopback<br><br>• Loop Up Remote Test<br><br>• Loop Down Remote Test<br><br>• DSU performing pattern test |
| CTS Line | The CTS line is asserted if DTE is not lost (RTS or DTR asserted if enabled), if no Out of Frame alarm is received from the network indicating the remote unit cannot receive transmitted signal and when no test (other than DTE Loopback) is running. To enable the test equipment to send a test signal—CTS is asserted in DTE Loopback. |
| RLSD/RR Line | The RLSD line drops to indicate the received line data is not valid payload traffic. (Includes cases when DSR is not asserted, indicating a test is running and is preventing the unit from carrying customer data.) |

Table B-5 describes the pin assignments for the DB-25 to RS-449 **DATA** port connector.

Table B-5   DB-25 to RS-449 DATA Port Connector Pin Assign.

| RS-449 | DB-25 | Signal Name | Signal |
|---|---|---|---|
| 17 | 24 | TT A | To DCE |
| 35 | 11 | TT B | To DCE |
| 7 | 4 | RS A | From DTE |
| 25 | 19 | RS B | From DTE |
| 24 | 16 | RD B | To DTE |
| 6 | 3 | RD A | To DTE |
| 22 | 14 | SD B | From DTE |
| 4 | 2 | SD A | From DTE |
| 11 | 6 | DM A | To DTE |
| 29 | 22 | DM B | To DTE |
| 27 | 13 | CS B | To DTE |
| 9 | 5 | CS A | To DTE |
| 13 | 8 | RR A | To DTE |
| 31 | 10 | RR B | To DTE |
| 26 | 9 | RT B | To DTE |
| 8 | 17 | RT A | To DTE |
| 5 | 15 | ST A | To DTE |
| 23 | 12 | ST B | To DTE |
| 19 | 7 | Signal Ground | |
| NC | NC | | |
| 1 | NC | Frame Ground | From DTE |
| 18 | 25 | TM | To DTE |
| 12 | 20 | DTR | To DCE |
| 30 | 23 | DTR | To DCE |

Table B-6 describes the pin assignments for the DB-25 to V.35 DCE connector.

Table B-6   DB-25 to V.35 DCE Connector Pin Assignments

| V.35 | DB-25 |
|------|-------|
| S | 16 |
| P | 3 |
| T | 14 |
| R | 2 |
| H | 6 |
| NC | NC |
| E | 20 |
| NC | NC |
| C | 8 |
| NC | NC |
| W | 9 |
| U | 17 |
| V | 24 |
| X | 11 |
| F | 4 |
| NC | NC |
| B | 7 |
| NC | NC |
| NC | 1 |

Table B-7 describes the DB-25 to RS-449 DCE connector pin assignments.

Table B-7   DB-25 to RS-449 DCE Connector Pin Assignments

| RS-449 | DB-25 |
|--------|-------|
| 8 | 24 |
| 26 | 11 |
| 13 | 4 |
| 31 | 19 |

Table B-7   DB-25 to RS-449 DCE Connector Pin Assignments

| RS-449 | DB-25 |
|--------|-------|
| 22 | 16 |
| 4 | 3 |
| 24 | 14 |
| 6 | 2 |
| 12 | 6 |
| 30 | 22 |
| 29 | 23 |
| 11 | 20 |
| 25 | 10 |
| 7 | 8 |
| 35 | 9 |
| 17 | 17 |
| 19 | 7 |
| NC | NC |
| NC | 1 |

Table B-8 describes the communication port pin assignments.

Table B-8   Communication Port Pin Assignments

| Pin | Signal | Description |
|-----|--------|-------------|
| 1 | DCD | Carrier Detect |
| 2 | SD | Send Data (from Solo Encore to terminal) |
| 3 | RD | Receive Data (from terminal to DSU) |
| 4 | | No connection |
| 5 | SG | Signal Ground (I-directional) |
| 6 | | No connection |
| 8 | | No connection |
| 8[1] | CTS | Clear To Send (I/O to all DSUs only) |
| 9 | | No connection |

1. CTS is used by the Solo E1 as a collision avoidance line. This line should not be connected at the CRT terminal end of the Communication Port cable.

Table B-9 lists the Communication Port parameter options.

Table B-9   Communication Port Parameter Options

| Parameter (Default) | Option |
|---|---|
| Baud rate (9600) | 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400 |
| Parity (None) | Even, Odd and None |
| Word length (8) | 7 or 8 |
| Stop bits (2) | 1 or 2 |

Table B-10 lists the pinout assignments for this adapter.

Table B-10 DE-9 to DB-25 Adapter Pinouts

| DE-9 | DB-25 |
|---|---|
| 3 | 2 |
| 2 | 3 |
| 7 | 4 |
| 8 | 5 |
| 6 | 6 |
| 5 | 7 |
| 1 | 8 |
| 9 | 23 |
| 4 | 21 |

# ≡ C  *Factory Default Configuration*

Table C-1   Factory Default Configuration

| Item | Default | Item | Default |
|------|---------|------|---------|
| **Unit** | | | |
| Unit ID | Unique ID assigned | Protect Mode | Disabled |
| **Network** | | | |
| CRC4 | Enabled | In-Band Communications Bit | Disabled |
| Main Synch Source | Network | Alternate Synch Source | Internal |
| **Data Port Configuration** | | | |
| Loss | DTR | Format | X.21 |
| Mode | DCE | Clock | SCTE |
| **Timeslot Allocation** | | | |
| Allocation Type | Contiguous | All Bandwidth Allocations | DATA01 |
| **Diagnostic** | | | |
| User Pattern 1 | 00110011001100110011 | | |
| User Pattern 2 | 00000001000000100000001 | | |
| **Alarm** | | | |
| Block All Alarms | Disabled | Loss of Signal from **DATA** port | Enabled |
| Net Carrier Loss Alarm | Enabled | NET Sync Loss Alarm | Disabled |
| Net UA1 Received Alarm | Enabled | CV Threshold Alarm | Disabled |
| Net RAI Received Alarm | Enabled | CRC Threshold Alarm | Disabled |

Table C-1   Factory Default Configuration   (Continued)

| Item | Default | Item | Default |
|------|---------|------|---------|
| **SNMP** | | | |
| IP Address | 0.0.0.0 | IP Subnet Mask | 0.0.0.0 |
| 1st NMS Address | 0.0.0.0 | 2nd NMS Address | 0.0.0.0 |
| 3rd NMS Address | 0.0.0.0 | Set Community String | public |
| Get Community String | public | TRAP Community String | public |
| Forward over IBC | Disabled | Output Port | COMM |
| **COMM Port and Terminal** | | | |
| Connection | In-Band Communications | Phone Number 2 | Not Assigned |
| Timeout when not Logged on | Unlimited | Phone Number 1 | Not Assigned |
| Timeout when not Logged on | Unlimited | Normal User Password | Not Assigned |
| COMM Port XON/XOFF | XOFF until XON | Superuser Password | Not Assigned |
| COMM Port | 9600, 8, no parity, 2 stop bits | COMM Port DCD | Disabled |

# ≡ *D*    *Configuration Worksheet*

Print, fill out, and keep this chart near the device.

Table D-1    Configuration Worksheet

| Item | Setting | Item | Setting |
|------|---------|------|---------|
| **Unit** | | | |
| Unit ID | | Protect Mode | |
| **Network** | | | |
| CRC4 | | In-Band Communications Bit | |
| Main Synch. Source | | Alternate Synch Source | |
| **Data Port Configuration** | | | |
| Loss | | Format | |
| Mode | | Clock | |
| **Timeslot Allocation** | | | |
| Allocation Type | | All Bandwidth Allocations | |
| **Diagnostic** | | | |
| User Pattern 1 | | | |
| User Pattern 2 | | | |
| **Alarm** | | | |

Table D-1   Configuration Worksheet  (Continued)

| Item | Setting | Item | Setting |
|------|---------|------|---------|
| Block All Alarms | | Loss of Signal from data port | |
| Net Carrier Loss Alarm | | Net Sync Loss Alarm | |
| Net UA1 Received Alarm | | CV Threshold Alarm | |
| Net RAI Received Alarm | | CRC Threshold Alarm | |
| **SNMP** | | | |
| IP Address | | IP Subnet Mask | |
| 1st NMS Address | | 2nd NMS Address | |
| 3rd NMS Address | | Set Community String | |
| Get Community String | | TRAP Community String | |
| Forward over IBC | | Output Port | |
| **COMM Port and Terminal** | | | |
| Connection | | Phone Number 2 | |
| Timeout when not Logged on | | Phone Number 1 | |
| Timeout when not Logged on | | Normal User Password | |
| COMM Port XON/XOFF | | Superuser Password | |
| COMM Port | | COMM Port DCD | |

# *Software Download*

## Menu-4A Download Utility

The Download feature provides a quick method to upgrade the device firmware. The features are:

- Separates the downloading operation from switching to new operational code, where these operations can be performed at separate times. The menu lets you set a time when to initialize the Solo E1 DSU with the new code.
- Allows the Solo E1 DSU to store two images of executable code, so you can switch between the two images.
- Enables downloading of the new operation code to be done while the Solo E1 DSU is operational and passing data. The code can be downloaded through:
  - XMODEM via the terminal user interface using an asynchronous connection.
  - TFTP from a NMS to the Solo E1 DSU via SLIP with an asynchronous connection.
  - TFTP from a NMS to the Solo E1 DSU via SLIP through the ethernet (with a MAP installed).

### Using the Download Utility

Use the DOWNLOAD UTILITY menu, accessed through the Menu-4 Main Configuration, to download software updates, using XMODEM or TFTP. When switching from one executable image to another, the operational software in the Solo E1 DSU is restarted, which results in a temporary service interruption of from one to two minutes.

During the download sequence, while executing the download operation or when executing from the Boot code, the Power/Test LED alternates red and green.

Figure E-3 is an example of the Menu-4A Download Utility using a PC transfer.

### Flash Download

Shown at the bottom of the Menu-4 Main Configuration (Figure E-1) is the Flash download option function that allows:

- Setting the FLASH Download parameters

• Downloading code.

```
SW Ver 2.1.c  MIB Ver 1.9    Digital Link SoloE1 Encore              6/02/98
HW Ver A                     Menu-4 Main Configuration                15:17:10
S/N                               Local:JD0034            Remote:JD0008
                                  ------------            -------------
UNIT   Protect Mode                    Disabled                 Disabled
       Idle Code                          0xFF
NET    Framing                      CRC4 Enabled             CRC4 Enabled

       Main/Alt Sync.                   NET/int                  NET/int
       In-Band Communications Bit             4                        4




-------------------------------------------------------------------------------
0-SNMP Config.   1-Main Status     2-Data Status    3-Reports    4-Main Config.
5-Data Config.   6-Timeslot Config. 7-Alarm I        8-Alarm II   9-Diagnostics
E-Flash Download
CR-changes a selection              Arrow Keys-move the selection
```

Figure E-1    Menu-4 Main Config.—Flash Download

**NOTE:** Before beginning any upgrade, you need to create a new directory on your hard drive and load the new code on to the PC.

## Setting Up for TFTP

The procedures for local or remote TFTP download are the same, except when you do not have a SLIP or telnet connection to a unit. The local unit is always the unit you are logged into and it's parameters appear on the left side of the screen. The remote E1 parameters appears on the right side of the screen.

If you do not have a SLIP or telnet connection to a remote unit, you need to perform the following steps before proceeding to set up for a TFTP.

1. **Connect via SLIP or telnet to the local unit.**

2. **Go to Menu-0 (see Figure 3-6 on page 3-16) to set up the IBC connection (IBC runs over a netlink). (Figure E-2)**

**3. Arrow down to the** `Forward Over IBC` **field and make sure it is set to** `enabled`**.**

Now proceed to Menu-4 and follow the steps for TFTP set up.

**Local DSU**       **E1 Payload**              **Remote DSU**



**SLIP connection**                    **IBC**
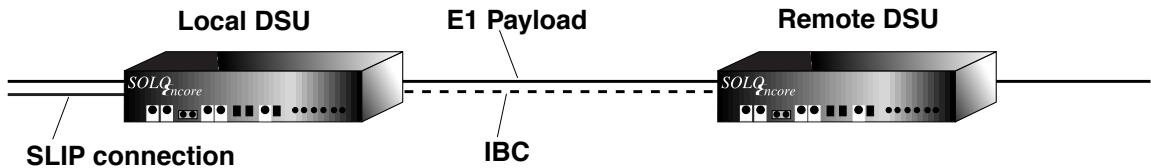
Figure E-2    Remote connection over IBC

## *Initiating TFTP*

**1. From Menu-4 Main Configuration (Figure E-1), type F** *(***as instructed in the Menu-4A (Figure E-3) for FLASH Download) to start the download session.**

**2. Set** `Protocol` **to TFTP.**

**3. Type** `1` **to initiate the local download, or type** `3` **to initiate remote download over IBC.**

**4. Start the TFTP transfer from the workstation.**

The Solo E1 DSU supports TFTP PUT. TFTP download requires binary mode and TFTP PUT.

From a UNIX workstation, the command sequence is:

```
# tftp ip_address_of_target_unit
# bin
# put filename
```

```
SW Ver 2.1.c  MIB Ver 1.9     Digital Link SoloE1 Encore              5/18/98
HW Ver A                      Menu-4A DownLoad Utility                12:09:32
                                   Local: JD0138          Remote: JD0008
                                   --------------         --------------
CODE FILE 1 Version           (Cur) SOLO  2.1.c       (Cur) SOLO  2.1.c
          2 Version                       Absent                   Absent

DOWNLOAD   Code File                          2                        2
           Status                          Idle                     Idle
           Error
           Bytes Received                     0                        0
           Protocol                      XMODEM                   XMODEM

CHANGE     Code File                       NONE                     NONE
           Method                     SCHEDULED                SCHEDULED
           Scheduled Date             01/01/96                 01/01/96
           Scheduled Time             00:00:00                 00:00:00
           Count Down          Press 2 to Start         Press 4 to Start

--------------------------------------------------------------------------------
0- Return to Menu 4     1- Local DownLoad        2- Local Codefile Change
3- Remote DownLoad      4- Remote CodeFile Change

CR-changes a selection          Arrow Keys-move the selection            _
```

Figure E-3    Menu-4A Download Utility

## Setting Up for XMODEM

To download new software:

1. **Create a new directory on your hard drive and load the new code onto the PC.**

2. **From Menu-4 Main Configuration, type** `F` **(as instructed in the menu for FLASH Download) to start the download session.**

3. **Set Protocol to XMODEM.**

4. **Type** `1` **to initiate the local download.**

5. **Start the XMODEM transfer from the PC and send the new code from the directory created in step 1 (or from a diskette).**

Table E-1 describes the parameters of Figure E-3.

Table E-1   Download Utilities Groups

| Group | Field | Description |
|-------|-------|-------------|
| CODE FILE | 1 Version | Version of the operational software in Code File 1. This field displays:<br>• Cur, for current operational software, with the version<br>• Absent, if there is no operational software stored |
| CODE FILE | 2 Version | Version of the operational software in Code File 2. This field displays:<br>• Cur, for current stored software, with the version<br>• Absent, if there is no operational software stored |
| DOWNLOAD | Code File | The Code File that will receive the downloaded operational-code, and that is currently not operational. |
| | Status | Shows the status of the download. This field shows either Success, Failed, or In Progress. Status is idle when no download is taking place. If the operation fails, a number indicates the specific problem of the failure. |
| | Error | Shows an error code if a failure occurs. |
| | Bytes Received | Shows the number of bytes received during a TFTP download. |
| | Protocol | Download protocol. Choices are XMODEM and TFTP. |
| CHANGE | Code File | Code File to be switched over when the scheduled time is reached. Choices are NONE, 1, and 2. NONE indicates that no change is desired, and can be used to cancel a scheduled change. |
| | Method | Either SCHEDULE or NOW. NOW: change occurs immediately; SCHEDULE: change occurs when the actual time reaches the scheduled time. |
| | Scheduled Date | Expressed in mm/dd/yy (month/day/year) at which the switch-over will occur. |
| | Scheduled Time | Expressed in hh:mm:ss (hours:minutes:seconds) at which the switch-over will occur. |
| | Count Down | Shows the time interval hh:mm:ss (hours:minutes:seconds) for the switch-over to occur after it has been initiated. If the switch-over has not been initiated, then it shows "Press 2 To Start" or "Press 4 To Start" for the local and remote Solo E1 DSU, respectively. |

The menu and download options for the Download Utility are shown in Table E-2.

Table E-2   Menu and Download Options

| Menu | Description |
|------|-------------|
| **0-**Return to Menu 4 | Returns to Menu-4 Main Configuration. |
| **1**-Local Download | Begins the download to the local Solo E1 DSU. |
| **2**-Local Code File Change | Begins the Code File change in the local Solo E1 DSU. |
| **3**-Remote Download | Begins the download to the remote Solo E1 DSU. |
| **4**-Remote Code File Change | Begins the Code File change in the remote Solo E1 DSU. |

**NOTE:** If you select menu options 2 or 4, the Code File to be changed next must not show ABSENT; otherwise, changes are not allowed.

## Abnormal Termination

The download process fails if any of these conditions occur:

- A corrupt software load.

- There are transmission errors.

- Failure of the downloading computer, the modem (if one is used), the connection between the downloading computer and the unit or a failure of the unit, (includes a power failure).

- User aborts the download process.

- A time-out occurs according to the XMODEM or TFTP protocols.

Typically, abnormal termination of the download process leaves the Code File in a corrupted state. The Download Utility indicates that the Code File is absent, or corrupted.

## Error Indicators

If the download utility or the operational software fails, an error indicator appears. Depending on the error indicator listed below, you can take the following action or at least be apprised of the condition, as shown in Table E-3.

Table E-3   Download Utility Error Indicators

| Error Indic. | Error Type | Description (Message) |
|---|---|---|
| 1 | General | Software error. Note the specific error information, and call Digital Link Technical Support. |
| 2 | General | Load Received is corrupted. |
| 3 | General | Load Received has invalid embedded length. |
| 4 | General | Load Received is invalid for this unit. |
| 5 | Hardware | Flash-ROM Not Supported. |
| 6 | Hardware | Flash-ROM With Protected Sector. |
| 7 | Hardware | Flash-ROM Failed To Erase. |
| 8 | Hardware | Flash-ROM Failed To Program. |
| 9 | XMODEM | XMODEM Abort Received. |
| 10 | XMODEM | XMODEM Data Timeout. |
| 11 | XMODEM | XMODEM Invalid Sequence. |
| 12 | XMODEM | XMODEM Unexpected Data. |
| 13 | XMODEM | XMODEM Packet Timeout. |
| 14 | XMODEM | XMODEM Packet Corrupted. |
| 15 | XMODEM | XMODEM Failed to Acknowledge. |
| 16 | XMODEM | XMODEM Reserved. |
| 17 | XMODEM | XMODEM Reserved. |
| 18 | XMODEM | XMODEM Reserved. |
| 19 | TFTP | TFTP Error Packet Received |
| 20 | TFTP | TFTP Invalid Mode. |
| 21 | TFTP | TFTP Invalid Opcode. |
| 22 | TFTP | TFTP Unexpected Opcode Sequence. |
| 23 | TFTP | TFTP Invalid Packet Length. |
| 24 | TFTP | TFTP Invalid Data Packet Sequence. |

Table E-3  Download Utility Error Indicators  (Continued)

| Error Indic. | Error Type | Description (Message) |
|---|---|---|
| 25 | TFTP | TFTP Request Timeout. |
| 26 | TFTP | TFTP Data Packet Timeout. |
| 27 | TFTP | TFTP Failed to Acknowledge. |

## *Download Aborted by User*

You may abort the XMODEM downloading process by typing `Ctrl-X`.

To perform the downloading abort, instruct the terminal emulator program to abort the XMODEM download process and return to terminal mode. The specific procedure depends on the terminal emulator program being used. The recovery is the same as explained under Abnormal Termination.

With TFTP, the procedure to discontinue the TFTP session depends on the TFTP setup. Again, the recovery is the same as explained under Abnormal Termination.

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